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BRIEFLY TOLD.

THE CLINTON MEETING, IOWA GAS ASSOCIATION.—Through some mishap or another our dispatches respecting the Clinton meeting of the Iowa Gas Association have gone awry. We have the "middle one," but "both ends" are missing. One special dispatch, dated the morning of the 26th, states in a general way that in every respect the meeting was completely successful. The technical sessions were replete with matter of practical value, and the entertainment was of the royal sort. At the "smoker" on Wednesday night 150 were on hand, and the steamboat excursion Thursday (200 "sailed") was enjoyed by all to the full. Our telegraphic advices thus close: "Put it down, as coming from everyone here that 'Tom.' Crawford is a gem as a presiding officer, and that as a host he is supreme."

ATLANTA WANTS THE 1912 MEETING, N. C. G. A.—Manager R. C. Congdon, of the Atlanta (Ga.) Gas Light Company, surely meant what he said to us at Montgomery last month, on the occasion of the meeting of the Southern Gas Association, as per the latest effort in that connection, which witness: The Atlanta Gas Light Company extends a cordial invitation to the National Commercial Gas Association to hold its 1912 convention in "Dixie," and in the city of Atlanta. We are all members of the Association, so that I can say "Our Association" has not yet favored this Southland with a visit. Our meetings have been held in the East, North and West, and as the Association is national in character, and as the South is a great and growing country, we feel that the Association next year should meet with us in Atlanta, where we have a magnificent auditorium and ample hotel accommodations. Our auditorium will seat 6,000 people, and in addition to the large arena, similar to that of the Madison Square Garden, and where the gas show can be held, there is a large convention room which can easily accommodate our Association, the accoustic properties of which are unexcelled. We believe many of our members will be interested to come South, as many have never seen this section of their native land. We want the Southern gas men to catch the spirit of progress so plainly evident in our Association, and we want also to show the members what is being done in the South for the general advancement of our industry. Our Company has subscribed $5,000 to help defray the expenses of the convention, and the city and many commercial bodies have been notified of our desire to bring the convention here, and we can rely upon their assistance, financially as well as in hearty co-operation otherwise. Trusting you will carefully consider the advantages of Atlanta as a place for holding our next meeting and hope that you will give us the assurance of your co-operation. $5,000 as a starter; well that looks a strong introductory argument!—EDS.

DEATH OF MR. W. H. ALLEN.—With exceeding regret we have to report the death of an estimable gentleman, and long-time useful member of the fraternity, in the passing of Mr. W. H. Allen, Manager of the Appliance Division of the Public Service Gas Corporation of New Jersey. Death claimed him at his home in Newark, N. J., the morning of the 20th inst., and the funeral services were held the 24th inst., in Trinity Episcopal Church, Newark, the attendance marking the recital of the ritual being remarkable for the representation of the industry, the annals of which are made all the more salutary by the cleverness of his career during his long and honorable connection therewith.

ILLUMINATING ENGINEERING SOCIETY, PHILADELPHIA SECTION, MAY MEETING.—The regular meeting of the Philadelphia Section, Illuminating Engineering Society, was held on Friday evening, the 19th inst. Preceding the regular session the usual dinner was served at

6:30 P.M., at Green's Hotel, at which twelve members and guests were present. After the dinner, adjournment was made to the Assembly room, Philadelphia Electric Company's building, 10th and Chestnut streets, where the meeting was called to order by the Chairman of the section, Mr. William J. Serrill, Mr. George B. Muth, the Secretary, also being present. All routine business being disposed of, Mr. Serrill introduced the speaker of the evening, Mr. G. H. Stickney, Illuminating Engineer for the General Electric Company, Schenectady, N. Y., whose subject was "Mill Lighting." The author stated that great strides had been made recently in the lighting of mills and factories, this being especially so in the steel industry. The employer was taking better care of his employees in regard to proper illumination, which was actuated to and from the standpoint of safety for and by protection. The question of economy, of course, entered into the question of proper illumination, but to a lesser degree, safety coming first. Economy was generally based on the extra amount of work a man could do per day with the increased illumination. There were three factors to be considered in the lighting of a mill or factory. First, the process to be lighted; second, the building; third, the illuminant at one's disposal. In illuminating concrete buildings, the lighting plan should be finished before the building work was started, for all outlets must be placed before the concrete is poured. Mr. Stickney showed a great many lantern slides of installations in mills and factories, in which both large and small units were used, sometimes one, sometimes the other, and at other times a combination of both. Mr. Stickney favored large units where there were high ceilings and where the proper direction of light could be obtained. An instance was cited where a mirror was used to reflect the light on to the work. In lighting a lathe, the light should be placed above, and to the right, of the head stock. The opinions of the workmen in most cases should not be taken into serious account. As the fine work in most establishments is placed near the windows, that space should be given a higher illumination than accorded to other parts of the room. The amount of light should be progressive with the process, for the starting processes do not generally require as high an intensity as the finishing processes. He stated that he had found only one plan where glare was desired, and this was in the foundry of a steel mill where molten metal was being poured. In this case arc lamps were hung so that, when the workmen looked up, they got the arc lamps directly in their eyes. The eye strain was too great when they looked up into a dark space. In lighting crane sheds the large units which are placed high are sometimes augmented by side lights placed below the crane. Flame arcs when used should always be placed high, for they threw the maximum light straight down. Steel shades were very often used in mill lighting, but the superiority of these shades over glass shades does not amount to much. A decrease in efficiency of 40 per cent., due to dust, was found in one installation after 3 months' time. Mr. Stickney showed a photograph and photometer curves of a steel diffusing reflector, designed by Mr. W. d' A. Ryan. It is claimed that this reflector throws light from more than one point on the desired object. He also exhibited steel reflectors with different size lamps, which were very glaring; but it was stated that, in a room equipped with these, the glare was not noticeable. The ensuing discussion was participated in by Messrs. W. J. Serrill, G. S. Barrows, Israel, F. J. Little and N. Macbeth. The questions and answers were as follows: "What kind of lamp should be used in a room for finishing metals?" Ordinary direct current arc lamps had been used with success. "Are large or small units used in lighting mills with gas? And is indirect lighting used with gas?" Both large and small units are used, and the proportion of indirect lighting is as high with gas as with electricity. "The number of accidents which happen in the dark months is greater than that during rest of the year. Is this due to poor artificial illumination?" Yes.—H. B. C.

NEXT MEETING OF THE GERMAN ASSOCIATION.—An invitation to the 52d Annual Meeting of the German Association of Gas and Water Engineers appears in the "Journal für Gasbeleuchtung *und Verwandte Beleuchtungsarten Sowie für* Wasserversorgung," or the organ of the "Deutschen Vereins von Gas und Wasserfachmannern." The underscored words are a recent addition to the title of our much respected and always interesting contemporary, indicating that it is a "Broadgage" publication and wishes to be so understood by whom it may concern: They mean (translated) "and kindred systems of illumination." The meeting will be held at Dresden, Germany, June 26, 27, 28, 29 and 30, and the "Preliminary Programme" is an indication that the meeting will be replete with interesting and up-to-date papers, being well worth visiting by all who are fortunately so situated as to be able to do so. The invitation is extended "To all Fellow-Craftsmen," and "guests introduced by members of the Association can rely upon a cordial welcome."—F. E.

BOOK REVIEWS.

New publications to hand include these: "Lectures on Illuminating Engineering."—The lectures on illuminating engineering, delivered at the Johns Hopkins University during October and November, 1910, have been compiled in 2 volumes, from the "Johns Hopkins Press." For sale by AMERICAN GAS LIGHT JOURNAL. Price $4. The scope of these lectures (the 2 volumes carry 1,052 pages) has been touched upon from time-to-time in the JOURNAL, but lectures of this nature have much greater value to the average man than that of a mere text book or paper. The fact that they were written to be delivered orally makes a most interesting reading. Considering the great scope of the work and that the lectures number 36, the arrangement and indexing are excellent. Those who were not fortunate enough to attend the lectures can easily and certainly should obtain copies of the volumes, for many of the papers could be re-read with advantage to all concerned, at meetings of employees concerned in the manufacture and use of artificial gas.

"The Principles of Scientific Management."—A concise statement by the dean of those interested in scientific management, or, as it is now called, efficient engineering, by Frederick Winslow Taylor, 144 pages, is published by Harper & Brothers, and the price thereof is $1.50. We have it for sale. The author in his introduction states that the book was written to point out the great loss the whole country suffers through inefficiency in almost all of our daily acts, and that the remedy for this inefficiency lies in systematic management, rather than searching for some unusual or extraordinary man. We are also told that the "best management is a true science." Great attention was given his previous book on shop management, which paved the way for a further appeal for greater care and attention in the management of enterprises both large and small. As many phases of the gas business are open to improvement along the lines indicated, undoubtedly the work will prove worthy of study to the point of thoughtfulness to the managers and engineers of the gas industry. This work will accomplish more towards the conservation of energy than would result from scores of expletives hurled against our captains of industry.

"High Efficiency Eectrical Illuminants and Illumination."—This is descriptive work, covering various types of electric lamps and accessories, by Rollin W. Hutchinson, Jr., 278 pages, 147 illustrations, published by John Wiley & Sons. Price $2.50. It may be ordered through us. The matter consists principally of reprints from manufacturers' bulletins, descriptive articles, etc., and the principal value of the work lies in the large number of lamps described rather than the thoroughness or care given to describing them. The book is dated September, 1910, but it nevertheless contains much matter that has become obsolete. Fortunately the engineers and officials having to do with ornamental lighting installations do not agree with the author as to what constitutes art and proper construction of posts, for one particularly un-ornate collection of standard fittings is described as an "artistic and well designed lamp post." The publication is not likely to supplant the various books along similar lines that have preceded it.

New publications to hand also include: "Board of Public Utilities' Commission, State of New Jersey, Annual Report for 1910."—This tome carries the first report of the New Jersey Commission since the jurisdiction of the former Board of Railroad Commissioners was extended to cover "Public Utilities." Copies of it can be obtained from the Secretary, Mr. A. N. Barber, Newark, N. J. The report contains 285 pages of matter, which narrates the complaints, decisions, with the various orders, schedules and rules promulgated by the body.

Another volume in like line has to do with tke Public Service Commission for First New York District. The records compiled are those for the year 1909, and three large volumes were required to hold them. The compilation is done in a way that puts much to the credit of the compiler, the Commissions' competent, painstaking, courteous Secretary. The various hearings, orders and opinions held, made and rendered by the Commission are given in detail, all of which is nicely complemented by statistics regarding the corporations operating in Greater New York; and these are given in detail.

A Comparison of Intrinsic Brilliancies of Frosted and Opal Globes.

Prepared for the JOURNAL, by MR. MAURICE S. WHITE.

The subject of intrinsic brilliancy of light sources is one that should, and does to a large extent, engage the attention of the illuminating engineer. In present-day lighting more attention is paid to the distribution and quantity of the light than to the physical comfort of the user. Both items are of fundamental importance and both should receive their due consideration.

Moreover, it is seldom that one can work by artificial light nowadays without having some light sources in his field of vision, and these light sources are usually of high intrinsic brilliancy. The effect of this on the eye is apparent. If we gaze at the sun for only a fraction of a second we see an after-image for a much longer period of time. The sun has a tremendously high intrinsic brilliancy, and the intense light, striking the retina of the eye, has bleached out the visual purple faster than it can be formed. The visual purple is the fluid in the retina of the eye which is acted upon chemically by the light, changing it into the sensation which is transferred to the brain by the optic nerve, much as in the case of the photographic plate in a camera.

As the visual purple is bleached by the light it is washed away and fresh fluid is supplied to take its place. When the visual purple is bleached faster than it can be supplied we have the effect of an after-image, as explained. Thus the filament of an incandescent electric light makes a cut in the visual purple, where its image falls momentarily on the retina and an after-image is produced.

We can readily understand from this why such light sources in the field of vision cause the eye much discomfort, reducing the visual acuity and causing drowsiness, fatigue of the eye, and the unpleasant sensation of glare.

We cannot avoid all discomfort of this kind in using direct lighting where the light sources fall within the field of vision, but we can reduce the discomfort materally by reducing the intrinsic brilliancy of the light sources. This is done more or less by opal, frosted and prismatic glassware, etc.

The following test, made in the Photometrical Laboratory of the United Gas Improvement Company, shows the relative effect on the intrinsic brilliancy of a mantle gas lamp when using French roughed and opal globes.

A Welsbach reflex lamp, with artificial silk mantle and clear inner cylinder, was equipped with:

(1) 5-inch French roughed globe.
(2) 5-inch opaline globe.
(3) 6-inch opaline globe.

The projected surface of the two 5-inch globes was divided into four zones, and that of the 6-inch into five zones, by means of screens placed tangent to the globe. Fig. 1 shows the form of one of these screens, and Fig. 2 gives the dimensions of the different zones.

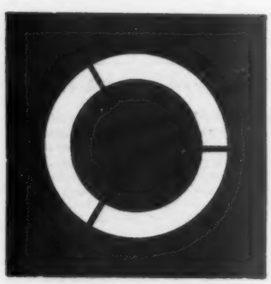

FIG. 1.

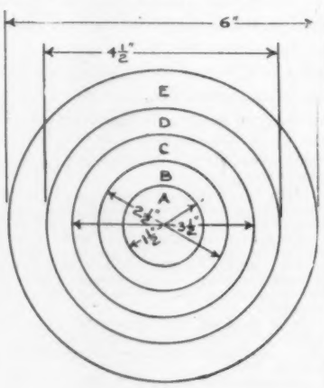

FIG. 2.

The horizontal candle powers of each zone, and also that of the whole globe, were determined. The candles per square inch of the zones are given in the table.

These figures put upon a mathematical basis shows, which is quite obvious to anyone who compares the French-roughed or sand blasted type of globe with the opaline type, namely, that the former has a bright spot in the middle which fades off rapidly into a dark area around the circumference of the globe, while the latter has a nearly uniform brilliant surface, the variation in which is so gradual as to be unnoticed by the eye. Moreover, the central portion of the French-roughed globe is of high enough intrinsic brilliancy to cause considerable discomfort to the eye when placed within the field of vision, while that of the opaline globes, especially that of the 6-inch one, is within the range of physical comfort.

	French-Roughed, 5-Inch.	Opaline, 5-Inch.	Opaline, 6-Inch.
Screen A	10.130	3.195	2.07
" B	6.105	3.040	2.10
" C	2.035	2.880	2.11
" D	0.970	2.090	2.03
" E	....	....	1.12
Whole globe	50.6	41.3	46.3

It may also be stated that the uniform brilliancy of the opaline type is far more pleasing to the eye and, therefore, better from an artistic standpoint than the French-roughed type. There seems to be a disagreeable sensation resulting from the latter globe, due to the fact that a spot of light of high brilliancy remains visible and yet the eye has not the satisfaction of a clear outline of this brilliant source, as it would have in the case of no globe at all or of clear glassware. In addition to this there is a scintillating effect around the edges of this bright spot due to each minute change in position of the observer, this being occasioned by the multitude of reflections from the vast number of irregular surfaces caused in the etching or sand-blasting process. On the other hand, the opaline globes are agreeable as giving a definite rounded outline to the source of light, which to the average eye offers an especially pleasing sensation.

Therefore, it would seem that the opaline glassware of this type offers one solution of the problem of physical discomfort, due to the light sources in the field of vision, and yet without a marked loss by absorption.

[OFFICIAL REPORT, AS FURNISHED BY THE SECRETARY.—CONTINUED FROM PAGE 1000.]

PROCEEDINGS, SEVENTH ANNUAL MEETING, ILLINOIS GAS ASSOCIATION.

HELD IN THE AUDITORIUM HOTEL, CHICAGO, MARCH 15 AND 16, 1911.

SECOND DAY—MORNING SESSION.

The Association reconvened pursuant to adjournment.

The President said: Gentlemen, the first order of business concerns some applications for membership, which the Secretary will please read.

APPLICATIONS FOR MEMBERSHIP.

Active.

Anson, C. L.	Crowley, W. P.	Knapp, W. R.
Boardman, C. C.	Foley, H. F.	Mitchell, H. K.
Bush, A. W.	Farrar, H. L.	Strasser, J. W.
Carswell, A. C.	Jackson, L. B.	Sherman, D. M.

Associate.

Brundage, K. B. Dirks, H. B. Leavenworth, M. Walters, L. H.

On motion of Mr. Battin the Secretary cast the ballot of the Association in favor of the election of the applications as read, and the Secretary so reported, whereupon the election of the applicants was announced.

The President—There seemingly not being anything to consider under the head of New Business, I introduce Mr. J. H. Roemer, of Madison, Wis., who will read his paper on

THE CAUSES AND EFFECTS OF A PUBLIC UTILITY COMMISSION.

Within the last few years a somewhat general demand for the enactment of laws creating public service commissions, with power to regulate all public service corporations, has arisen in many States. This seems to be the natural and logical sequence of the regulatory measures respecting railroads and other common carriers now in effect in the nation and in most States. Whatever may be the views and attitude of those who manage and direct the affairs of such corporations in respect to the subject, the time has arrived when State surveillance of all corporations and individuals engaged in public callings is essential to the common weal. Unfortunately, however, the real reasons justifying such action on the part of the State have not always been advanced or been potent to create public sentiment favorable to such legislation. Much of the agitation has been, and is, based upon superficial and inconsequential grounds, and emanates

from a somewhat general conviction that most public service corporations are exacting exorbitant charges from the public for the services rendered, and are concealing the fact by paying moderate dividends upon a fictitious capitalization. While the view thus entertained is grosssly exaggerated, it cannot be successfully controverted that overcapitalization, coupled with imprudent management, has frequently been a menace to the proper performance of the public functions of such corporations according to the full measure of duty imposed upon them by law as well as by voluntary contractual provisions. In such instances the eagerness of managements to demonstrate their administrative ability, by declaring dividends upon stock, results in the curtailment of operating expenses to such a degree that the rendering of efficient service becomes impossible, also in the neglect of proper maintenance of the property and in the failure to make provision for depreciation. Thus the public, on the one hand, is made to suffer by reason of poor service, and the bondholders, on the other hand, are likely to suffer by reason of the diminution in value of their security. Under such circumstances, when replacements become necessary to the continuance of operation, they can be provided only by the issuance and disposal of additional securities. Thereby the capital account becomes charged with expenditures that should have been taken and saved from the operating revenues.

Much hostility also to the managements of public service corporations has been engendered by negotiations between municipalities and such corporations for the granting of franchises, which negotiations have not always been free from the suspicion that improper methods have been employed to induce those representing the public in the transactions to consent to terms and conditions detrimental to the public interest. As a result public service corporations are more or less a factor in local politics, and the manner of their regulation is often an issue in local political campaigns. This is unfortunate, both for the public and the corporation, for the legitimate interests of both in the public utility are jeopardized. In the conflict neither seems to recognize its proper relation to the other, nor to realize that the effective regulation of a public service corporation, in respect to the performance of its public function, cannot be had by means of ordinances or contracts. As franchises are usually for a long term of years, it is obvious that the attempt to prescribe in detail the obligations of the public utility to the public, or *vice versa*, during the life of the franchise, must of necessity fail. No one can foresee in a quarter century the changes in the arts embraced in public utility service, the development and necessities of the communities served or the requirements of the utilities to perform their functions under conditions which must necessarily change in the progress of time. Less than two decades ago I saw in my home city an electric power plant just completed which was regarded the most modern and efficient plant of the kind in existence. Its capacity was considered enormous. Engineers and others interested in the advancement of the art of generating electric energy came from all sections of the country to view this plant, which was equipped with the most modern appliances.

For the past few years this plant stood idle most of the time, serving merely as an auxiliary in emergencies. It is but an evidence of how rapidly the art has advanced and rendered obsolete the most expensive appliances. The advancment in the art of telephony within a very few years is little less than marvelous. Costly equipments have been scrapped and entire systems reconstructed to meet the public requirement for the best service. In other utilities the changes have not been so marked, and equipment has become more or less standardized; but who can tell what a quarter century may bring forth in any art or science? To meet the conditions as they arise is the only way that the best interests of the public and the utilities can be conserved in the matter of rates and service. Any franchise which attempts to anticipate the needs of the future in these respects, and provide for the same, which most franchises do, sooner or later becomes inadequate to satisfy existing requirements and prolific of contention between the community and the utility. Even where the right to fix rates and establish standards of service from time to time has been reserved to common councils in such franchises, intelligent action has been rare. The expenditure of large sums of money by the larger municipalities, to ascertain all of the essential facts necessary for intelligent and lawful action on the part of the common councils invested with power to establish rates, has more frequently been wasted than profitable, as the facts thus acquired have generally been ignored and action taken which was either prompted by prejudice or based upon ulterior political considerations. Litigation necessarily followed, which involved the further outlay of large sums of money on the part of the public and the utility, all of which in the the end had to be paid by the taxpayers and patrons of the utility.

It was with a view of placing public utilities, upon a sound basis and eliminating all unnecessary friction between the public and such concerns, due to causes arising from ignorance of the economic status of public utilities and their moral and legal relations to the public, that the Wisconsin Public Utilities Law was framed and enacted. The economic features of this law, which are fundamental in its structure, are the result of exhaustive study and investigation and consideration given to the subject by Prof. John R. Commons, University of Wisconsin. After more than 3½ years' administration of the law the wisdom of the sound, economic basis upon which the law was constructed has been demonstrated, and the results obtained from its operation have been generally satisfactory to the public, the utilities and the investors in the security of such concerns.

Among the more important provisions of the law are those relating to valuation, uniform accounting, standard units of products or service, publicity of rate schedules, fixing of rates and regulations, indeterminate franchises and the purchase of public utility plants by municipalities. It will be impossible to consider at length the effects of all these various provisions without extending this discussion to an inappropriate length. However, reference will be made to the more important features of the law that its general effects may be more fully appreciated.

The law requires the Commission to value "all the physical" property and "all the property actually used and useful for the convenience of the public" of every public utility subject to its provisions. Over 1,000 public utilities in the State are under the regulation of the Commission. Of these the Commission has appraised to date about 100. The method of valuation adopted by the Commission, as shown by its decisions, is a subject of such magnitude that it cannot be touched upon here. Suffice it to say that no appeal has even been taken by either a utility or a municipality from any valuation made by the Commission, and that the question of capitalization is no longer capable of seriously inflaming the public mind in any community in Wisconsin.

Very soon after the enactment of the law preliminary steps were taken by the Commission toward carrying into execution those provisions relating to the establishment of standards for the quality of service rendered by the public utilities companies, and to the enforcement of such standards in a manner consistent with the spirit of the law. It was realized from the first that the proper administration of the provisions of the law relating to standards of service would necessitate the establishment of a circulating laboratory equipment, to be used in fixing the legal units and standards, and in putting the same into practice on a permanent and uniform basis throughout the State. After some preliminary discussions and conferences an agreement was entered into whereby the extensive laboratory facilities of the University of Wisconsin were, as far as practicable, made available for the purpose of the Railroad Commission, with the understanding that there should be reciprocal use of the instrumental equipment to be purchased subsequently by the Commission. This arrangement proved especially advantageous to the Commission, since it afforded an opportunity to act with deliberation in choosing the instrumental equipment ultimately required in handling the work on a large scale. Following closely upon the agreement with the

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Note.—Sec. 1797m-3.—Every public utility is required to furnish reasonably adequate service and facilities.....

Units of Product or Service. Sec. 1797m-22.—The Commission shall ascertain and prescribe for each kind of public utility suitable and convenient standard commercial units of product or service. These shall be lawful units for the purposes of this act.

Standard Measurements: Accurate Appliances. Sec. 1797m-23.—(1) The Commission shall ascertain and fix adequate and serviceable standards for the measurement of quality, pressure, initial voltage or other condition pertaining to the supply of the product or service rendered by any public utility and prescribe reasonable regulations for examination and testing of such product or service and for the measurement thereof.

(2) It shall establish reasonable rules, regulations, specifications and standards to secure the accuracy of all meters and appliances for measurements, and every public utility is required to carry into effect all orders issued by the Commission relative thereto.

Measuring Instruments, Testing, Tres. Sec. 1797m-24.—(1) The Commission shall provide for the examination and testing of any and all appliances used for the measuring of any product or service of a public utility.

(2) Any consumer or user may have any such appliance tested upon payment of the fees fixed by the Commission.

(3) The Commission shall declare and establish reasonable fees to be paid for testing such appliances on the request of the consumers or users, the fee to be paid by the consumer or user at the time of his request, but to be paid by the public utility and repaid to the consumer or user if the appliance be found defective or incorrect to the disadvantage of the consumer or user.

Public Equipment for Tests. Sec. 1797m-25.—The Commission may purchase such materials, apparatus and standard measuring instruments for such examinations and tests as it may deem necessary.

Entry Upon Premises. Sec. 1797m-26.—The Commission, its agents, experts or examiners, shall have power to enter upon any premises occupied by any public utility for the purpose of making the examinations and tests provided in this act and to set up and use on such premises any apparatus and appliances and occupy space therefor.

University authorities above mentioned, the co-operation of the United States Bureau of Standards at Washington was solicited with the further result that definite arrangements were made whereby the standards used in the administration of the Wisconsin public utilities law shall, as far as practicable, be subject to verification and control with reference to the official government standards at Washington.

A further instance of important co-operative work during the preliminary period of developing standards, and in the selection of testing equipment best suited to the demands of the situation in Wisconsin, consisted in the appointment by the American Gas Institute of a special committee on gas calorimeters. One of the members of this committee was Prof. C. F. Burgess, who is in charge of the gas and electric service inspections for the Commission. Part of the work of that committee was handled by members of the Commission's staff, and the results of these investigations were made immediately available for use by Wisconsin gas plants.

Gas and Electric Service Inspections.—The arrangements above outlined, it should be explained, while intended to apply to any phase of the question of units or standards which might arise under the public utilities law, were naturally of more immediate use to the Commission in connection with gas and electric service.

A preliminary canvass of current practice, relating to standards of gas and electric service elsewhere in the country, threw but little light upon the question of fixing the proposed standards. In fact, it was at once realized that a special field study of the service actually rendered by the Wisconsin gas and electric companies would be a necessary preliminary to the intelligent formulation of the contemplated standards of service and the rules governing the same. In undertaking these field studies it became necessary to provide special field equipment which early took definite form as "traveling laboratories." After some progress had been made in this preliminary investigation, the results were thrown into shape, to be presented at a general conference at Madison in March, 1908. At this informal hearing the owners and operating officials and experts of the various gas and electric companies of the State were given an opportunity to express their views in relation to the proposed standards of service. The programme or outline of these discussions included the following points:

GAS SERVICE.

I. Accuracy of meters:
   1. Method of testing.
   2. Limit of error allowable.

II. Calorific valve:
   1. Importance.
   2. Method of testing.
   3. Minimum value.
   4. Variation allowable.
   5. "Gross" or "net" values.

III. Candle power:
   1. Importance.
   2. How defined.
   3. How measured.
      a. Kind of photometer.
      b. What standard.
      c. What kind of burner.
   4. Minimum value.
   5. Variation allowable.

IV. Composition:
   1. Restriction as to impurities.
      a. Ammonia.
      b. Sulphur—total.
      c. Sulphur as H_2S.
      d. Diluents.

V. Installation:
   1. Safety.
   2. Adequacy.

VI. Pressure.

ELECTRIC SERVICE.

I. Accuracy of meters:
   1. Method of testing.
   2. Limit of error allowable.

II. Uniformity of voltage.
   1. Allowable variation from normal.
   2. Interruptions.

III. Lamp efficiency:
   1. What provisions for lamp renewals.
   2. Voltage.

IV. Installation:
   1. Safety.
   2. Voltage llmits.
   3. Adequacy of wiring.

In addition to those directly representing Wisconsin interests, there were present at this conference gas and electrical experts from other States, also an official representative of the Government Bureau of Standards. The proceedings of this conference were supplemented, upon request by the Commission, by communications received from those in attendance and from other sources. In the light of the information thus gathered, and further important data brought together through the means of additional tests of service throughout the State, a preliminary set of rules relating to gas and electric service was formulated by the technical staff serving the Commission. After further conference and discussion, these rules were officially adopted by the Commission, July 24, 1908, to become effective 3 months thereafter (see decision No. U-21, "*In re* standards for gas and electric service in the State of Wisconsin").

If one may judge from the large number of inquiries received from many sources during the 2½ years since these rules were promulgated by the Commission, it is safe to say that gas and electric experts throughout the country have now become familiar with the essential features of these Wisconsion rules relating to quality of gas and electric service. The writer, therefore, assumes that interest at the present time centers in the results attained through the enforcement of these rules rather than in the rules themselves. It is hoped that the following brief comments will throw some light on this phase of the question.

After adopting the rules a number of difficult questions presented themselves for solution. Among these none was more perplexing than that of determining upon the size of sfaff giving its time exclusively to the field inspections of gas and electric service. In the light of the facts gathered in the preliminary studies already referred to, it was decided to work out several plans for consideration and discussion. One of these plans contemplated the least possible expenditure which could conceivably keep the Commission informed in a general way as to the conditions throughout the State; a second scheme provided quite liberally for a staff-and-field equipment, and was designed to place considerable emphasis on the immediate and vigorous enforcement of the rules; a third plan calling for an expenditure intermediate between the other two was adopted by the Commission and put into effect shortly after the rules were adopted. This organization, which has been slightly modified from time-to-time to meet changing conditions, at present provides for a field staff of 9 men.

The entire staff of gas and electric inspectors at first made headquarters at Madison, but more recently the State has been divided up into 3 inspectional districts. One of these districts comprises the northeasterly section of the State with a resident inspector stationed at Appleton; a second covers the northwesterly portion with headquarters at Eau Claire; the remainder of the State, comprising the entire southerly portion and a narrow strip between the other two districts, is administered from the staff headquarters at Madison. The results obtained under this latter plan have proven satisfactory both as regards the efficiency of the inspectional work and as to economy in administering the work of the staff.

In reviewing the work thus far accomplished by the inspections of gas and electric service under the Wisconsin public utilities law, special interest centers in a statement submitted to the Commission covering the operations of the engineering staff for the fiscal year ended June 30, 1908. This statement, it should be borne in mind, was prepared in the light of an experience of considerably less than 1 year's time, since active operations along technical lines under the utilities law began late in the calendar year 1907. Following is a quotation from the statement referred to:—

"The work performed by the special staff of experts engaged in inspections of gas and electric service consisted in the study of conditions existing in various cities of the State, and included observations on the accuracy of consumers' meters; the accuracy of methods employed by gas and electric companies, in standardizing such meters; the quality of gas as shown by chemical composition and heating value; the pressures at which gas was being delivered to consumers; the pressures and variations in pressure on electrical distribution systems; the efficiencies and deterioration of incandescent lamps; and various other factors relating to adequacy of service. Laboratory investigations have also been made on methods suitable for measuring quality of service, including a study of calorimeters suitable for

determining heating values of gas. Special attention has also been given to the investigation of complaints of consumers to determine what factors are the more frequent causes for dissatisfaction. The aims of the work have been to furnish information useful in arriving at the operating values of certain gas and electric plants, to determine to what extent complaints of service made by consumers can be taken as a criterion of the quality of service rendered, and more especially the information was sought as a basis for establishing rules under which the companies may operate so that adequate service may be insured to the consumers.

"During the progress of these investigations numerous instances of poor and inadequate service were found. It appears that, in the majority of cases, the defective service was the result of ignorance or neglect of the conditions due to the lack of suitable supervision or the need of instruments necessary for studying the quality of service. It has been found that in various instanees the companies have been needlessly hampered by certain municipal regulations, the purpose of which was to insure good service, but which were actually ineffective. Numerous instances of poor service have been rectified by the public service companies upon their attention being called to the particular defects, and it has not been infrequent that such improvements have been made with little or no expense. It has been demonstrated that the consumers themselves are in some measure responsible for the maintenance of adequate service and it has been one of the purposes of the investigation to formulate information serviceable to the consumers in protecting their own interests."

Upon reviewing the foregoing quotation, in the light of the further observations by the inspection staff during the period of 2 years or more since these preliminary impressions were recorded, it may be said that little is to be added with respect to the character and general scope of the work done by the staff. We cannot do better than to refer for details to the report of the work of the engineering staff contained in the annual reports of the Railroad Commission, particularly in the reports for the years 1909-10. It has been a source of gratification to the Commission and to its staff that the rules for the regulation of gas and electric service adopted in 1908 should have stood the test of searching criticism directed against these rules from many sources. Among these criticisms none were more searching than those of the Commission's staff itself; for it was scarcely hoped at the outset that a piece of pioneering work of this sort should escape considerable modification in the light of further investigation and experience. The rules themselves have stood in substantially their original form, although it recently became evident that, in order to have uniformity in the interpretation placed upon the rules by the various inspectors and utilities, it would be desirable to explain many details with regard to the exact meaning of these rules. For this reason the inspection staff, with the approval of the Commission, has adopted certain interpretations of these rules with regard to gas and electric service. Owing to lack of space these interpretations will not be presented in this paper, but reference is made to a discussion of this phase of the matter, to be found in the report of the work of the engineering staff for the year ended June 30, 1910.

Information gathered in the course of the preliminary studies by the Commission's staff, in advance of the preparation and adoption of the formal rules, made it plain that in the earlier stages of the administration of these regulations it would be necessary to provide for some flexibility whereby those utilities which were unable to meet the prescribed standards at the outset could be given a reasonable opportunity to swing into line. The spirit of the Commission with respect to such concessions is clearly set forth in the following paragraph quoted from the discussion which formed a part of the decision (U-21) of the Commission promulgating the rules of service:

"If any management anticipates or experiences difficulty in complying fully with such rules and regulations, it is expected that application for a modification of the rule or rules with regard to which difficulties are encountered will be made to the Commission; but until a modification of any rule or regulation herein prescribed has been expressly authorized by the Commission, the gas and electric companies will be expected to comply strictly with the terms of every rule and regulation ordered herein. It is possible that certain plants are operated under conditions which make it impracticable, or not to the best interest of the public, to meet all the requirements of all the rules. Under such conditions it devolved upon the utility to show to the Commission, by complete and convincing evidence, that a modification of some rule or rules should be made. Suggestions and criticisms are at all times welcomed by the Commission."

With the development in the familiarity of operating conditions, due to the more extended personal contact by members of the inspection staff with the various local situations, it has, of course, become practicable to distinguish intelligently between instances of poor service, where there was considerable justification for the same, as distinguished from those cases where the application of the penalty provided by the law should ultimately be called for. During the past year in particular it has been the policy to follow up more persistently cases of serious violation of the rules. Without going into detail in this phase of the question, it may be stated in brief that there has been, with few exceptions, a steady and gratifying response on the part of the managements of the various utilities in the direction of meeting the standards of service prescribed by the Commission. It was believed that, by exercising due patience in this "follow-up" process, it might be practicable to avoid altogether the application of the penalties provided for infraction of the public utilities law with respect to the quality of service. It was with much reluctance that the Commission was finally obliged to abandon this hope, since it became necessary to take vigorous steps toward meeting the requirements of the law. Judging from the results of this recent action, there is reason to believe that the penalties need in future be applied only in very exceptional cases.

Summing up the experience thus far gained along the lines above discussed, it may be said there has been a steady and distinct development throughout the State towards the establishment of a better understanding between the managements of the utilities and their patrons. Just to what extent this change is due to the fact that there has been an actual improvement in the quality of service rendered it is difficult to say; although it is certain that this phase of the matter has had considerable influence in bringing about a readjustment of the viewpoint of public utilities officials. Some utilities, which had not given attention to the satisfactory maintaining of the service until obliged to do so, have come to view the matter from another angle; and this readjustment of viewpoint, it is believed, must necessarily in the long run lead to a cultivation of a spirit of legitimate pride in the quality of service rendered to consumers. The impression of those in contact with this work throughout the State is that the outlook is decidedly favorable.

The foregoing discussion of the quality of service has centered chiefly upon standards of gas and electric service and the administration of the same. Lack of time prevents going into detail with respect to field inspections relating to telephone service. These inspections have been made to a large extent by the staff busily engaged about the State in gas and electric service inspections, although during a part of the year the time of one skilled inspector is given exclusively to secret tests of the telephone service rendered by the principal exchanges throughout the State. A careful analysis and study of the data thus gathered, confirmed by a somewhat extensive contact through personal interviews and correspondence with the officials of telephone companies, warrant the belief that the general hopeful outlook, with respect to the quality of service rendered by telephone companies, is not essentially different from that just stated in regard to gas and electric utilities.

There has also been considerable activity along the lines of testing the quality of service rendered by water companies. These tests have related chiefly to the quality of the water supplied and to the character of fire streams provided in various cities and villages of the State. There has also been some agitation of the question of the accuracy of water meters. An equipment has been provided for making the field observations along these and related lines, and it is believed that considerable progress will be made in the next year or two in the establishment of a basis for interpreting adequacy of service in these utilities. Reference should also be made to some investigations which have been made relating to the quality of service supplied by heating companies.

Throughout these investigations, a large proportion of which have been of an entirely informal character, there has appeared a genuine appreciation of the fact that these matters, many of them the cause of much irritation, could be referred for adjustment to a body with investigating and regulating powers and having no interest whatever in the outcome.

The work of revising rates is probably the most readily appreciated feature of the utility law. Conditions existing in Wisconsin at the time of the enactment of that law were unquestionably bad. From a statistical study, made in 1908, after the law had been in effect a full year, it was estimated that 55 per cent. of the total number of utility plants had been charging discriminatory rates. The amount of free

and reduced service was alarmingly large, and often, as investigation showed, these discriminations were probably forced upon the operating company. In places schedules were so worded as to furnish more gas or electric current for less money. Frequently the utility was saddled with rates from which departure was impossible without arousing public prejudice.

Much of the work of adjustment accomplished since that time has been by informal correspondence or conference. Much of it has necessitated formal proceedings, investigations and orders, before reasonable and equitable rates could be substituted for those previously in force. In many instances it was found that, while the principles forming the basis of equitable rates were recognized as sound, few companies had the courage to change existing conditions and make readjustment of their own rate schedules in accordance with these principles unless aided and sanctioned by the Commission. The form of rate schedule placed in effect has as far as possible been prepared upon consideration of cost of service. It has given due recognition to the necessity of securing business for the company and thus obtain a lower average rate for the consumers, and has endeavored to obviate or correct the tendency to furnish certain classes of consumers at the expense of other consumers. It is gratifying to note the increase of business following the adoption of these schedules, and the interest and discussion that they have aroused in trade journals, and the voluntary efforts made by utilities to adjust their rate schedules upon a similar basis.

An important feature of the work in administering the public utility law which is now nearing its completion is the establishment of the uniform classification of accounts. It will be recognized that, before standards of efficiency and economy in management can be established, it is necessary to have comparative statistics illustrating what has been and can be accomplished by the various utility plants. For this purpose a common schedule for reporting financial, operating and statistical information was devised and a uniform classification of accounts prescribed to insure identity of treatment in reporting the separate items of balance sheet and income account.

The work of drafting a uniform classification of accounts presents many difficulties. Owing to the sweeping nature of the utility law, the schedule must be made sufficiently elastic to include both privately owned and municipal plants, and furnish similar information for gas, electric, water, telephone and heating utilities. It must place organizations, proprietorship, partnership and incorporations upon a similar basis. It must give recognition to the different methods of generation and distribution in each utility. It must provide for an effective and equitable separation of common expense items, where two or more utilities, such as combined gas and electric plants, are conducted under one management; and, finally, it must be sufficiently elastic to furnish similar information for the large, the medium sized, and the small operating plant. The preparation of such classifications necessitated much co-operative work with the utility companies before what was deemed a practicable system of accounts could be produced.

These classifications have now been in effect for 2 years. In addition to the utilities operating under them in Wisconsin, numerous companies outside of this State have adopted the prescribed accounts with little modification. Thus far but few changes of minor importance have suggested themselves. Adaptation by the separate utilities was of necessity slow. A large amount of educational work is always necessary before radical departures in business methods are willingly accepted by men who have been in the business for a generation. Care was taken at the outset to insist simply that the returns provide the various groups of expenses and earnings called for in the classifications, leaving the utilities themselves to provide their own bookkeeping practice in reaching the resulting figures called for. From the very beginning, however, the statistical and accounting department has been called upon to make suggestions upon such accounting matters as methods of controlling the distribution of the payroll, accounting for stores and supplies, etc., information which it rapidly equipped itself to furnish. In its work this department has gathered a large number of forms which, properly tabulated and indexed, serve as an elaborate reference work of utility accounting practice.

It is now recognized that the Commission cannot expect proper reports from some of the smaller utilities unless, in addition to supplying mere information, it renders practical assistance in reorganizing systems of accounts. Wisconsin utility associations have recognized the same problem. At present the State Telephone Association has employed expert accountants to draft in consultation with the Commission all accounting forms necessary for the smaller telephone companies. I believe it is the purpose of this Association to print and distribute these loose-leaf forms at cost to members of the Association. Similar standardization of business procedure is expected in the water, gas and electric utility files.

The expense and effort necessary to secure the statistical information have paid from the start. The financial schedules as filed with the Commission have served a variety of purposes. They have indicated the growth of the utility business and have formed the basis of information submitted in rate cases. They have been widely used and quoted by persons interested in the financial standing of individual plants. They have formed the only reliable means of comparing operating conditions of 1 plant year-by-year or of similarly situated plants during a single year.

An unique and important feature of the Wisconsin system of accounts, in which it differs from similarly prescribed classifications in other parts of the country, and concerning which it was submitted at first to much criticism, is that it endeavors to serve as a basis for ascertaining the cost of service. It was early recognized in Wisconsin decisions that the cost of furnishing public service is an important element in fixing reasonable rates. Accounting information which cannot show what utility or what class of service is conducted at a loss does not fulfill its purpose as a financial report and does not justify the expenditure of much time and money.

The insistence that expenses be charged to the public service for which they are incurred has led to some significant results. An instance is recalled where a company operating a gas, electric and street railway business in two States made "rule-of-thumb" apportionment of the general and other common expense items as between the various departments of its business. An investigation showed that, with readjustment of amounts charged to these accounts, certain reductions were properly made in the electric rates of the company. Since that date this company has been one of the most ardent advocates of the classification of accounts. It has recently changed its method of generation, made its own calculations and voluntarily reduced its rates for electric service below those previously ordered effective by the Commission. Municipally owned plants were found to have generally failed to credit the time of the city treasurer, city clerk and city engineer to the water or lighting utility business. Frequently a city assumed and repaid all bond issues utilized in construction of the utility plant and accrued interest from the general fund. In only scattering instances was any allowance made for depreciation. On the other hand, it was found that no credit had been made for service used by the municipality. These instances might be multiplied at great length. It may be stated, however, that progress thus far made has demonstrated the feasibility of a cost of service classification of accounts.

Some additional work is necessary before some of the schedules submitted to the Commission can be accepted as correct for statistical purposes. Certain essential features of reports must be verified by inspection. The companies' methods of apportioning common expense items between the different services rendered, their practice of distributing labor costs and of handling maintenance accounts and depreciation reserves must be inquired into.

It seemed clear that the small utility occupies a very important position in Wisconsin, both as regards number and the population served by it. In order to demonstrate the relative importance of the large and small utility, I have prepared a table covering all the water, gas and electric utilities in the State, and have divided these into 2 groups, one of which includes all utilities operating in cities of over 10,000 population, the other in cities under 10,000 population. This table shows the total population served by the several utilities included in these groups, the value of the property and plant of the utilities, the number of utilities, their total operating revenues and expenses, the total number of consumers furnished with service, and the total connected load of the electric utilities. This table will show that of 110 water utilities 90, or 82 per cent., are located in cities of under 10,000 population; of 48 gas utilities, 28 are small plants; of 163 electric utilities, 143 are in cities of under 10,000 population. Again, it will be noted, that cities in the State supplied with electric service have a total population of nearly 1,000,000, of which total over 30 per cent. is supplied by utilities in cities of under 10,000 population. If we exclude Milwaukee from the group of larger cities, the percentage supplied by small utilities becomes 45 per cent. Of the total number of electric consumers in the State it will be noted that the small utilities supply 46 per cent. The table shows a number of other ratios which still further emphasize the importance

of the small utility in Wisconsin. I have excluded telephone and electric railway companies because these utilities quite often supply more than one city, and have considered that the water, gas and electric plants are sufficient to demonstrate the importance of the small utility.

In view of the figures shown in the tables, it is clear that the Commission is amply justified in devoting considerable attention to the small utility. The assistance given to small utilities by the Commission may be roughly divided into three general heads: Accounting, engineering and statistical. A point to be noted in this connection is that the Commission is not encroaching upon the private practice of engineers and accountants to any appreciable extent in giving engineering and accounting advice to small utilities. In fact, the Commission is increasing the field of operation for engineers and accounts in private practice by demanding of the smaller utility better service and better records, and bringing to their attention the importance of these features. In requiring annual reports of all utilities, based upon a uniform classification of accounts, the Commission has furnished utilities with a logical and reasonable system of accounts. In requiring good service of utilities, the Commission has compelled more efficient operation and management. Mere contact on the part of these utilities with the Commission's engineers and inspectors and members of the statistical and accounting departments has, in itself, been of valuable service to the small utility. Inspec tors, when visiting utilities and making routine tests and inspections, are able to suggest to the operators many changes which work towards better service and more economical operation.

It is a fact that the electric, water works and gas associations have not devoted much attention to the small utility. It is only reasonable to expect that the managers of large utilities shall dominate the week of conventions of these Associations. The small utility manager naturally hesitates to bring his troubles before such Associations, and the Commission, in a sense, occupies toward the small utility a position which should be taken by these various Associations. It is not intended to criticise these Associations, because the work done by them is of tremendous scope and importance; nevertheless, it will hardly be disputed that the small utility has not received the consideration which its importance, especially in Wisconsin, would justify. There is an increasing number of informal matters coming to the attention of the Commission which involve the small utility, both private and municipal. Quite a few small electric utilities are lately beginning to give day service. Practically in all of these cases the Commission has been requested to determine a fair rate for this service. In a number of small cities disputes have arisen between the city and the lighting plant in regard to the rates for street lighting. Rather than enter a formal complaint and have a formal hearing, the city and utility have agreed to submit the matter to the Commission informally, and have the Commission deter mine upon a fair rate. In a number of cases small utilities have asked the Commission to revise their entire schedule of rates. In order to facilitate work along these lines it is intended to publish the rates, rules and regulations of all the utilities in the State, and by comparison and the use of hypothetical plants, to demonstrate what are reasonable rates, rules and regulations.

I have brought these figures and points to your attention, wishing to emphasize the important position that the small utilities in Wisconsin occupy and the matters in which the Commission assists the small utility. In connection with this I would like to submit for your consideration an outline of the information which is necessary in working out a schedule of rates for electric utilities. It is intended by this outline to show in brief form the principal facts which should be available in working upon a schedule of rates. It is intended to follow this outline by selecting from among certain types of plants, such as a steam plant in a city of under 5,000, a plant of normal investment and normal operating expenses, and showing the figures for this plant, to work out a schedule of rates and set down certain reasonable rules and regulations which will serve, in a manner, as a guide for plants of this character.

[Then follow tables headed respectively: "Importance of Small Utilities in Wisconsin; "Percentage Distribution," and "General Information," which contain statistics respecting the value of property, population served, operating revenues, also expense accounts, receipts, etc., in so far as these relate to the gas, water and electric light utilities of Wisconsin. A third table has to do mainly with the questions formulated by the Commission which are to be answered by the respective utilities on demand.]

Concluding his presentation of the matter, Mr. Roemer says: Since 1907 the Commission has disposed of 207 formal utility cases and 886 informal cases. It has passed upon 142 stock and bond certificates, the majority of which were granted upon application for increase in capitalization of public service corporations. While it may be somewhat early to describe what has been accomplished under the law, it may be said that certain tendencies for better conditions and better feeling between consumers and utility are apparent in Wisconsin. The work of the Commission and the co-operation of the utilities under the provision of the utility act have been jointly responsible for this betterment.

The extension of utility business since the operation of the law has been very gratifying. Electric utilities in the State during the last year have increased their operating revenues 20 per cent., and their income 29 per cent. New construction for the year increased 145 per cent. over that for the preceding year. Water utilities increased their operating revenues 7 per cent., net increase, 15 per cent., and new construction, 22 per cent. Telephone utilities increased their operating revenues, 11 per cent., net income, 9 per cent., and new construction, 14 per cent.

Discussion.

The President—We have listened to a paper which has certainly been a most interesting one, and I trust the discussion will take place here instead of down in the lobby of the hotel where most of the discussions are carried on. This is the place to discuss it, so that we can all have the benefit of your ideas. Mr. Rice, will you open the discussion?

Mr. Rice—I was only asked last night to speak on this paper, and it is with great hesitancy that I do so, because, being certainly a very comprehensive document, it is a difficult to discuss in any way. It is surely a great compliment to this Association for Mr. Roemer to come and give us this very interesting account of the work of the Wisconsin Commission. We consider it will be very valuable to us to digest. It occurs to me it is not quite sufficient proof as to the absolute justice of all the decisions of a commission that there is no contest of such decisions. Mr. Roemer and the Wisconsin Commission will and doubtless have recognized that a moral wrong may be done in some instances which may be a real error, where a legal contest may not be possible. The Commission in Wisconsin has at times rejected the testimony and opinions of some of the most eminent engineers in the gas industry. They will doubtless, however, recognize that these gentlemen in presenting these opinions are beyond suspicion as to their sincerity in the ideas they advance, and will doubtless continue to give great weight and due consideration to such opinions. The Commission has taken up at various time the very difficult question of the rate of earnings to be allowed to public utilities. As I understand it, absolutely final decision upon this question has also been given. Coincidentally the question of depreciation has been taken up, and in the decisions two methods of figuring it have been advanced, namely: First, the straight line method; second, the accumulative interest method; but, as far as I have been able to ascertain, no final decision has been formulated as to which method is correct. No doubt the Commission finds these questions very difficult of final decision. Yet, the business world must necessarily wait with very great expectancy on the final determination. The Commission must recognize that the rate to be allowed capital for entering a business is a very important, probably the most important, question in the business, and that the method by which such capital shall protect itself in handling its inevitable depreciation is of equal importance. The question of final return on capital cannot be considered and determined alone on companies already in existence or as they now exist. This country, and all the various utility enterprises that it contains, will keep on growing, and the great interest of the people in this country is that capital shall always feel free to enter and expand the utility business which is of so great importance to all citizens. If capital can only expect a return or nearly that which it can get by loaning money at current rates of interest, it will certainly not take upon itself the burden and risk of conducting a manufacturing business. It seems to me the public bodies to which are entrusted the formulation of rates, together with all other matters, such as depreciation, that affect rates, must lay down as one of the first principles that, to the people who invest their money in these undertakings, must be allowed a return on investment which will be similar to that which they might expect in other lines of manufacturing industry. The work done by the Commission in Wisconsin on standards and rules of service has been to date certainly great, and of inestimable value to the gas industry throughout the country. The Commission certainly must not pause in this in-

vestigation and decide that it has reached the limit of endeavor, and it certainly will not do so. In at least one of its rules, as they exist to day, it has gone against the opinions of some of the best engineers in our business; namely, the rule that gas meters must be removed once every 3 years. Some of our best posted engineers believe that such a rule is detrimental; that the meter is taken out at a time when it can best be allowed to remain in service, or when it is at probably the best period of its usefulness. I understand that the utilities in Wisconsin have been very slow to adopt the indeterminate franchise provision of the law; and it seems to me that such a provision will be slow of adoption unless the law provides a necessary safeguard, as to the possible repeal of the law itself; and what standing the public utility would have under the law if, having abandoned its existing franchise and accepted the indeterminate provisions of the Commission law, the Commission law itself were later on to be repealed. It would seem there should be a provision in any such law that in such a case the original franchise should revert to the utility. Possibly I am wrong in assuming this provision has not been placed in the law, but I have not found it. The Commission has been very liberal with its report, and, when asked by any utility outside of the State, has freely mailed its various decisions; yet one can well appreciate the hesitancy with which the utility outside of the State calls upon our Commission for the expense of mailing all its literature, and I have, therefore, always felt and hoped these various State commissions. would adopt a rule whereby they would charge a small fee for forwarding these reports, whereupon the outside utilities would feel less hesi ancy in asking for them. An utterance of the Commission in Wisconsin has given rise to much comment. In a recent decision, speaking of the salaries paid to officers and employees by a certain utility, the doctrine is announced that the gas and electric business requires less executive and managing ability than any other manufacturing business.

Mr. Roemer—That was a mistake.

Mr. Rice—That would be certainly one step toward paternalism. The Cammission in Wiscousin, and all other commissions as well, must recognize that the paternal management of public utilities is not the ideal management, and that while they have done a great and noble work in lending to the small companies the ability of their executive staff and their engineers, they should certainly encourage all the utilities to obtain the highest grade of ability by paying reasonable salaries. [Applause.]

The President—Does anyone else present desire to discuss the Roemer paper? As I said before, I am sure you will discuss it downstairs, and why not do it here? If there is no further discussion we will call on Mr. Roemer to close.

Mr. Roemer—I do not know that I have anything to say in reply except, I presume, where we have rejected the testimony of experts, unless in the matter of going value. I am pleased to say in such connection that the Federal Court, in the case of the Missouri, Kansas & Texas Railroad *vs.* Love, has adopted the position taken by the Railroad Commission of Wisconsin; and also in a recent case in the Supreme Court of Oklahoma, the same principle has been applied. It may not be the correct theory, in the opinion of some engineers, but it seems in the cases to which we have applied our method of measuring going value more equitable results have been attained than if we had accepted the theories of the engineers, although we accept the views of those men as evidence on the subject, but not as conclusions. Let me say, in regard to that opinion last spoken of, that it is not the view of the Wisconsin Commission. The statement criticized was inserted in the opinion and did not catch the eye of the Commissioners, other than the one who wrote the opinion.

Mr. Rew—We have listened to a very timely paper from Mr. Roemer, and we are much indebted to him for it and for his time in coming here to read it. Therefore I think we ought to offer Mr. Roemer a vote of thanks, and I move that such rising vote of thanks be extended to Mr. Roemer.

[Seconded by Mr. Newberry, put and carried by a unanimous vote.]

Mr. Roemer—I thank you, gentlemen. It has been a great pleasure for me to be here to-day.

An Invitation from Iowa District Gas Association.

The President—We have with us this morning the President of the Iowa Gas Association, Mr. A. B. Burt.

Mr. Burt—Members of the Illinois Gas Association: It is with peculiar pleasure I sat and listened this morning to the papers, and watched your methods and compared these with those of the Association over whose destinies I have the honor to preside this year. We have a vigorous Association, comprising the States of Iowa, Nebraska and South Dakota. There are many things in common in these two Associations, not alone in the honorable lineage that we may trace to a common parentage in many instances, but also in the fact that the utility commission problem is practically the same in both States. Our annual meeting is to be held at Clinton, Ia., May 24, 25 and 26, and my purpose in coming here this morning is to extend on behalf of the Iowa District Gas Association a most cordial and hearty invitation and welcome to your membership and your officers to meet with us on these dates. [Applause.]

(To be Continued.)

[Official Report—Furnished by the Secretary—Continued from Page 1001.]

PROCEEDINGS, THIRD ANNUAL CONVENTION, PENNSYLVANIA GAS ASSOCIATION.

Held at Reading, Pa., April 12, 13 and 14, 1911.

First Day—Morning Session.

The President asked the Secretary to report the names of

Applicants for Membership,

which, having been done, on motion of Mr. W. G. Anderson, the Secretary was instructed to cast the ballot of the Association in favor of the election of the gentlemen named. The Secretary subsequently reported that the instruction had been carried out, and the President welcomed those of the applicants who were present to active participation in the proceedings.

The Secretary-Treasurer then presented his annual reports, accompanied by the certification of the Auditors as to the correctness thereof. These were (on motion of Mr. L. O. Williams) ordered received and filed. The

Report of Committee on Badges

was handed in by Mr. H. D. Gillingham, who declared that a design had been accepted, and that a sufficient number had been struck off to enable each member to secure one. The price of badge was fixed at $1.50.

The President then announced that the Association was ready to accept the

Report of Committee on Nominations,

which was read by Mr. R. M. Wilson (Chairman) as follows:

The Pennsylvania Gas Association—Gentlemen: Your Nominating Committee recommends the following names for office bearers during the ensuing year:

For President.—Mr. C. M. Butterworth, Milton.
" *First Vice-President.*—Mr. H. H. Ganser, Norristown.
" *Second Vice-President.*—Mr. W. H. Rhoades, Williamsport.
" *Secretary-Treasurer.*—Mr. W. H. Merritt, Lebanon.
" *Members of Council.*—Messrs. L. S. Williams, Jno. A. Frick and Geo. B. Bains.

On motion the President was empowered and directed to name a committee of two (Messrs. Lamson and Dutton were selected) to cast the ballot of the Association in favor of the election to office of the gentlemen named.

The Committee, having reported action in consonance with the instruction, the President declared the election, and asked President-elect Butterworth if they might have a word from him in connection with his elevation.

The President-elect—Gentlemen, I am greatly pleased with the honor conferred and thank you heartily for the election. I will use my best efforts to make a success of the meeting next year.

Vice-Presidents-elect Ganser and Rhoades also suitably voiced acknowledgment of their advancement from the ranks.

The President called President-elect Butterworth to the chair, and then read the

INAUGURAL ADDRESS.

[For the text of the Message, see Journal, *ante*, p. 795.]

On motion, the address was referred by Chairmrn Butterworth to a committee (Messrs. Anderson, Mansur and Lamson) for consideration and report; and the President resumed the chair. Having made several announcements of a routine nature, respecting the place and hour for assembling to share in the entertainment provided, he introduced Mr. C. M. Butterworth, who read his paper on the

QUALIFICATIONS FOR A SUCCESSFUL MANAGER OF A PUBLIC SERVICE CORPORATION.

[For the text of the Butterworth paper, see JOURNAL, *ante*, p. 851.]

Discussion.

The President—This very ably written paper is now open for discussion. I find on the programme that Mr. W. O. Lamson, Jr., of Westchester, is reported as one of the gentlemen to discuss it.

Mr. Lamson—You have all heard this interesting paper by Mr. Butterworth. To digress a little from the subject matter, we all have our ideals and endeavor to carry them out, but I think Mr. Butterworth sets a very excellent example to follow. There are three points in it which impress me. First, easy access to the manager. I think that is a very important one, for it appeals very strongly to the public in general. They would much rather, if possible, see the head of the company on coming to the office with complaints. They believe their complaints are serious ones, and so like to have questions answered by someone whom they feel is competent to tell them. Another question I think likewise of importance is courtesy to consumers. It goes a very long way towards satisfying the people when they come to the office to be treated courteously. If put off with some casual remark, or the clerk who answers the complaint is not thor oughly informed, seemingly endeavoring to treat them as though he were informed, but gives them wrong answers, creates a very bad impression in their minds; and I think that is particularly important to all gas companies. Mr. Butterworth spoke, among other things, of the importance of handling work on schedule time, which is undoubtedly a question that comes before us very strongly. It is very disappointing to the average consumer to order work to be done, then to wait and be put off day after day until the work is completed; yet it seems to me a very reasonable and an easy matter to adjust the time schedule for work. In fact, I think it can be done very easily. In other words, if a gas company had a time set for doing certain work, in accordance with the particular situation, and the number of men employed, together with the amount of business they have, by conforming to that time schedule and telling the men definitely that the work will be put in; that if an order is taken they are satisfied the work is done according to our orders; they are pleased and there is no complaint afterwards. It has a tendency, I think, to save a lot of work that might otherwise be left or be cancelled. Another question is the education of employees. There is no question that employees of a company cannot do proper work or look after a large property unless thoroughly educated, not only in their own department but in all departments. Of course, I suppose most of you gentlemen have organized and have in force employees' meetings. I think that plan has been largely adopted in the last two years. Certainly good work is done by calling the employees together once a month, taking up certain kinds of work, explaining the matter thoroughly to them, instructing them thoroughly in all the features of that work, all of which is going a long way towards educating them properly and effectually for the work they are to do. I also believe these meetings should be left largely to the control and operation of the men themselves, in that it has been my experience that, if they go to these meetings expecting the superintendent or some one in charge of the plant to talk to or address them, pointing out these things to them, they are very apt not to take as much interest as though put upon their own resources, or if one of their number were called upon to explain the points and talk about them. This creates a feeling in their minds that they are of some importance and are gaining knowledge that they have gathered. Thus it is of more benefit to everybody in their eyes. There is no question that many of our employees are able to gather a great deal of knowledge that many of us never get, and encouraging them to get up and talk brings out a good many points of benefit to the company. Another question to my mind is the class of men to be employed. I have always taken the stand that a gas company is something different from another or ordinary corporation that does work in the streets. We deal with different classes of customers or people to those generally dealt with by ordinary corporations. We are called upon to go to their homes, even into the rooms of their homes, to meet and talk with them and going over matters with them. Certainly we want good, clean, decent men to do our work, men who are a credit to us and in whom the consumer has some confidence, whom they like and whom they do not mind having come to their homes to go over the work. Such men are not hard to get. I think we should graduate from the employment of the ordinary class or lower class of men. Mr. Butterworth touches on the question of adjustment and attention to consumers' complaints. Within the last year I have been forcibly impressed with the necessity of doing this, through giving more attention to complaints. I think we should see that no complaints go unrecognized as far as possible. In other words, if it is possible to adopt a standard form of maintenance, not only for individual people and stores, but for individual houses as well, by working on some kind of a basis where they could take care of consumers, visiting their houses every week or two, seeing that their lights and ranges are in good service, making a reasonable charge for it; such care certainly appeals to them. It eliminates a lot of the unnecessary complaints from poor service. The average consumers, both of the householding and the commercial classes, do not give the attention to their lights that they should. The lights get in bad shape, and the company is immediately blamed for the poor conditions. I believe in getting at them before the thing starts, and I believe it can be done.

Mr. Owens—At one point Mr. Butterworth says the gas may be uniform both as to candle power and B.T.U., but I think it a very difficult proposition to make both candle power and B.T.U. equal. At the time the Wisconsin Commission adopted its rules that matter was pretty well threshed out, so it was determined to simply call the heat units. A very interesting discussion was had at the time, and personally I think if the company can make either one or the other uniform it is doing pretty well. As to the question of advertising, I believe newspaper advertising should be done to produce some sales' results, and not cultivate simply a kindly editorial attitude. Further, advertising should always be instructive, not critical. By which I mean, say something good about your own appliances, but do not say anything, if you cannot say good, about the other brother. Speaking to the question of encouraging employees, the author says: "This places him in closer touch with his men and gives them the impression that they are contributing to the company's success." I think this should read, "Causes them to realize that they are;" for there is no question that they are contributing. If the manager does all the things that Mr. Butterworth recommends that sentence which says, "There is a general tendency among consumers to feel that they will get no satisfaction by making a complaint to the gas company," I believe should read, "There was a general tendency."

Mr. Anderson—In reading this very interesting paper I have been inclined to analyze it practically. To be a successful manager of a public service corporation, or, to put it differently, the manager of a successful public service corporation, you must have a large class of satisfied or pleased consumers. In order to do that the population served must be impressed with the integrity and the desire to render the good service that they should have. It is manifestly impossible for the manager to impress himself upon all the population that he serves, therefore, he must reach them through his men, which I believe brings us back to the latter part of the second paragraph, referring to the accessibility of the manager. I would add to that the idea that the manager should not only be accessible but free at all times; that is, not to burden himself—a tendency that has to be fought most constantly—with a mass of detail that prevents him from having time to be accessible to the employees, through whom he is impressing himself, his own ideas or impressions upon the population, but also to consumers who may have complaints, real or imaginary. And I believe by watching that carefully and making himself accessible, the manager can bring about the point Mr. Lamson speaks of, of reaching complaints before they occur.

Mr. Ganser—One sentence on the first page of this very interesting paper particularly appeals to me. I have always made it a practice to hold myself in a receptive condition to have employees make suggestions. Our employees have brains, by virtue of which they are employed by us. They also have some very excellent ideas and, if encouraged, they will suggest many things that will add to the creating of improved service. It has been our custom, ever since we have been in the business, never to harshly criticise a man for something he has done, but rather to find out why he did it. This puts the employee in the position of explaining himself and at the same time giving the manager very often an opportunity of learning something. Another matter Mr. Butterworth must have had in mind in writing this paragraph was the treatment by the manager of the employees. When a manager of a gas company gets to such height in his own mind as to pass his employees on the street, without giving them a nod or a pleasant word or particularly a pleasant expression, that manager cannot expect he is going to have their future cooperation. It does not make any difference under what circumstances, or under what conditions, you meet those men; let them know

that you know and recognize them, that you feel they are of your corporate family. I know that this pays.

Mr. Brock—Two points are mentioned over which I think something may be said. The Brooklyn Gas Company has established a very elegant club house for its men in Brooklyn. That is open every night. They have meetings once every week for a different department. One department meets this week, another the following week, and so on. One meeting a month is fixed by the company, at which they are addressed by an expert in a particular department, and at that time everybody in that department is asked to attend that meeting. They make their employees understand it is their duty to be at that meeting to learn something. The consumer who comes into a gas office meets there frequently a young lady in charge. He asks a question, and the young lady or gentleman, not being informed, gets out of it by saying, "That is not in my department." Consequently the consumer does not get the desired information. If those employees were trained so that they would know the answers to these various questions they could treat the consumer much more intelligently and there would not be occasion for the employee to say, "It is out of my department." I think a night should be set aside once a month by the company when the employees are divided to attend the meetings. Another point is that of promising a date for the performance of certain work. A clerk takes the order, the consumer asks for a date to be set, and former trying to oblige, says, "We will do this work such-and-such a day." The clerk may not be prepared to answer that question, but the order is made by him and sent to the head of the fitting department, where there may be work ahead of it. One plan I know that is used by one of the companies is, when a consumer asks for a date the clerk says, "We think we can do it on such-and-such a date." In order to emphasize it a card is attached to the order which notes, "We have promised this work to be done on such-and-such a date. If those conditions cannot be met, notify us." When the superintendent of the fitting department finds he cannot do the work on that day he notifies the order department, who in turn notifies the consumer, and the latter, while the work is not done that day, is not kept at home waiting for the men to come. That is a very good idea to keep in mind.

Mr. Perkins—Last night Mr. Bains spoke of a method he uses in handling monthly meetings. If he would explain it we would thank him very much.

The President—Will you tell them, Mr. Bains?

Mr. Bains—Perhaps it really does not come under this paper, but referring to what Mr. Brock said, I do not believe in compelling men to attend, but to cause the meetings to be so interesting that they will attend voluntarily. A man who works for us all day long, knowing he has to go out that night, does so with a "tired" and disagreeable feeling, but if he knows that he is going to share in a session that will at once afford information and entertainment, I think he will probably go unless he has a very good cause for absenteeism. If he does not feel sufficiently interested to go the chances are he is a man you want to get rid of. These meetings we had once a month—of course, ours is comparatively a small plant; and all departments take part in the meeting. The employees hold the meeting themselves. There is a chairman a secretary and a committee on arrangements. I attended those meetings, but only do what the employees ask me to do. Suggesting a certain topic for the next meeting I will try to get somebody to deliver an address thereon. The first part of the meeting we have the address, which will probably last from 8:30 to 10. Then the company gives the men a little spread. If does not cost much, probably sandwiches and coffee, oysters and coffee or the like. After that the men themselves go on with their own little entertainment. They have singing and recitations; some of them play music and bring their own instruments. We provide cigars and smoking tobacco. That lasts till probably 11:30 or 12, and the fellows are really waiting for the next meeting to come around. Those are in every way very successful. I might add that they are not compelled to attend them, but they, with very few exceptions, all do attend.

Mr. Dutton—While Mr. Bains was speaking on the subject in regard to compulsory attendance at the meetings in the evenings, I was wondering if the company paid them for their time.

Mr. Bains—We provide the entertainment and refreshments.

Mr. Dutton—The plan of compelling men to attend meetings has been solved in very few instances in a way satisfactory to the men. Someone must be unusually tactful in handling a situation of that kind without having the compulsory suggestion come to the minds of the employees. To meet that condition the men come in on the company's time two evenings a week during the winter, and on payday. Of course, local conditions enter quite largely into our situation, by reason of the scattered territory in which we are operating, and we found it very difficult to get the men evenings unless we paid their expenses. They had to pay 50 to 75 cents to attend, and naturally it worked unsatisfactorily to have them come in and spend an hour or two. We felt from our standpoint it was worth all it cost to have the men come in on the company's time afternoons, and spending half hour of their own time, so we provided by having an hour on the company's time and half an hour overtime, 4:30 till 6, paying the expenses. In building our works we provided a room for such meetings. The company equipped that room, and in our organization we have it distinctly understood the company will not ask the men to do anything that the company will not do. We meet them half way in the organization benefits. When a man is ill or otherwise incapacitated the company meets him half way, so they feel we are co-operating with them in the success of the venture. We frequently, as Mr. Bains suggested, add, by providing the means of the entertainment. I am speaking now of one of the monthly evening meetings; that is, of the Employees' (not the Company's) Association. It is their own Association, and we have provided apartments and equipment for them.

Mr. Chewning—One way of compelling men to come is by showing it is to their interest to come to these meetings. Oftentimes points come up as to how work should be done in certain cases. If those points had been taken up at previous meetings, and one who was not then present says, "I didn't know it was done that way, or that a certain thing had to be done," we immediately put it to the man that it was taken up at such-and-such a meeting, and if he had been there he would have seen and heard of it. A man once asked for a raise in wages who happened to be a man that had not been at very many of the meetings. I pointed out to him we could not give him the raise at the time for the reason he had not shown proper interest. He claimed he had shown proper interest and I pointed out to him that he had not, as he had not been to these meetings to see what was going on. I noticed him at the next three or four meetings, and he got his raise later. Then he began to take real interest, trying to pick up new things that were being done.

Mr. Frick—I would like to emphasize the importance of having the men conduct the meetings themselves. For quite some time we held meetings at which I was the presiding officer and it finally simmered to the fact that one person was doing all the work. I would take up the subject and look about to get hold of somebody to read a paper or to respond, and it came to pass they looked to me to provide the entertainment for the evening. We started a different plan this year by forming a sort of organization. We have a complete list of officers, including a board of five governors, the latter taking a man from each of the five departments. Now it is up to them to run their meetings. This board selects the subjects, picks the men to present those subjects, and the men to open the discussion. So much difference was created in working along those lines that we started to issue a bulletin. The men do that themselves. It is about 8 by 10, just a double sheet done on a duplicating machine. You can write it all off on the typewriter, and with a special carbon paper can take 50 to 75 copies. The first issue was very much of a success, and for the second one more material was handed in by the men themselves to go into this bulletin than we could publish in the paper. That is done now every month a few days prior to the meeting (we have monthly meetings), showing any installations out of the ordinary which have been put in during the month by the shop, with sketches—we can very easily duplicate any sketch at all—or something out of order which has happened. It also gives the programme for the next meeting and the speakers, with the various little notes of interest and personals, which always, in a paper of that kind, develop into very interesting reading. It all shows what can be done by putting things up to the men themselves, not having them depend on one person to do it. Giving them that much confidence or leeway causes them to feel that the meetings are really for their own benefit and that they are not being brought here simply to be lectured or told how or how not to do a thing, or be called down, as they express it; but the meetings really are for themselves and for their own interest, and that they can make them just exactly what they want to. A man said to me the other day he thought at the next meeting they would have some sort of a very short talk, then have a musical programme with a literary annex; and "didn't I think that would be a pretty good idea?" Of course I heartily agreed that it would. That sort of thing is duplicated, and there is no foretelling to just

what efficiency you can bring them. I do not know whether this bulletin idea is new or not; but it certainly is effectual, its cost is trifling, and it tends to give added interest to the meetings.

A recess was here ordered to terminate at 2 P.M.

(To be Continued.)

The Cathels Sealing and Locking Device for Meters.

United States Letters Patent (No. 991,479) were recently issued to Mr. Edmund Cathels, of Providence, R. I., for a device designed for the easy and positive locking and sealing of the cocks of gas meters. The thought of the inventor was to perfect a device which would save the cost incidental to the cost of removing gas meters and connections from the premises of ordinary consumers, which removal is usually next to having, and within short time, to replace the meter and the incidental connections in the self-same place. The Cathels device saves the cost of all such trouble and vexation in both money and time. The device securely locks the meter cock, leaving the meter perfectly secure from interference until it is formally again put into use. As many gas men know, the frequent handling of meters, and their oft-time conveying from place-to-place, cause no good, to say the least, to these vessels, and the Cathels system of locking overcomes the losses incident to disarrangement and the charges for carting as well.

Degea Glow Bodies of Artificial Silk.

Under this title, as noted by Mr. Frederic Egner, Mr. H. E. Mueller, of Berlin, Germany, in the *Journal für Gasbeleuchtung*, briefly describes samples of incandescent mantles, made of ramie or cotton fiber, and compares them to other mantles made from material described as artificial silk. Six microscopic views, enlarged 75 diameters, are given in the illustrations accompanying the article, which conclusively show the superiority of artificial silk. The weaknesses heretofore shown in the latter are said to be entirely eliminated; and as the Auer Association, of Germany (which corresponds there to our Welsbach Lighting Company here), proposes to handle this new filament or material, it will, of course, be soon seen in this country.

Special English Correspondence.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, May 10, 1911.

Modern Oxide Purification.—Teclu's Gas Testing Apparatus.—An Official Specification for Tar.

There was a time when the changing of the purifiers on a gas works was not only a daily but also to some extent a nightly part of the operations. But really things are moving so rapidly that one may expect that this very unpleasant operation will become almost the event of a life time. No one thinks anything, in these days, of running a box for 2 years or so without a change. We were accustomed to read in the text books that oxide can be used a dozen times or so, with alternate revivifications, before being spent, and that after that time it will be found to be charged with 50 per cent. or more of sulphur. But under modern conditions of working, the oxide is charged with sulphur to a limit considerably exceeding the 50 per cent. at one operation, and without being removed or spread in the revivifying shed. It is not a question of lead paper, but if a change is necessitated the cause will be back pressure, or saturation of the material. It is determined in fact by the facilities for taking care of the expansion that follows the absorption and precipitation of sulphur. Several conditions have united to bring about this satisfactory result. In the first place the gas at the inlet to the purifiers does not contain such a large proportion of sulphuretted hydrogen, because the washing and scrubbing with anything from strong liquor down to clean water are much more energetic. In making sure of all the ammonia a considerable proportion of sulphuretted hydrogen incidentally disappears from the scene. The importance of this will be evident when we remember that gas is purified as it flies. If it could be treated by turning a convenient quantity into a closed vessel, and agitating till all impurity had disappeared a few fractions per cent. more or less would be of little consequence. But when it is a question of passing gas at a steady rate, and changing as soon as a foul test shows at the outlet, there is all the difference in the world between 0.6 and 0.8 per cent. H_2S, at the inlet. Next there is the importance of thorough condensation and removal of tar, which are accomplished not only before the dry, but before the wet purification. The large puddles of tar that were formerly always to be found in the bottoms of the boxes, have now disappeared, and the material is no longer called upon to complete the removal of the tar. Some of the earlier troubles were due to the material being charged to an appreciable extent with tar, which not only interfered with its legitimate function but also with the revivification. So the gas now arrives at the purifier inlet free from tar, and *minus* some 25 per cent. of the H_2S. There is also considerable improvement in the vessels themselves, by which the cost per unit of area or content has been reduced to less than half. Some time ago the question of replacing a set of $\frac{4}{12}$-foot with $\frac{4}{6}$-foot was under consideration. The old types were fitted with waterlutes, and were independent vessels set with a 6-foot working gangway between them, and supported at the height of 10 feet above ground level by strong girders. There was a large center valve to work three on and one off, with connections arranged radially to each box. The new set was made up in one block, which at once reduced the area of the sides 25 per cent., and fitted with light dry faced covers, two to each box. The arrangement for lifting these covers was a very light and simple affair compared with the two large Goliaths used with the old set. A very simple type of valve was used, and this together with the very small quantity of connecting pipe required, was carried on the top of the vessel. The author was very precise in specifying that only the additional cost as compared with that of the old set, was to go to capital. In the end he found there was a *minus* balance to deal with, and that the cost of the new set was less than that of the old one, though the increased area was in the proportion of $2\frac{7}{6}:1$. For many years it has been known that the life of the purifiers can be prolonged by admitting about 2 per cent. of air with the gas at the inlet of the purifier without detriment to the illuminating power. But it is also known that the revivification does not take place until after the gas has been purified. To get the full benefit of the revivification there must be at least two large boxes, one to take care of the H_2S and the other undergoing revivification. This has led up to the alternating method of working. The old plan was to follow round in rotation, the gas first entering the foulest box, and finishing with a clean one. But the new plan is to put the foul box last in the series. Starting with two purifiers, 1 and 2, worked in the order indicated; as soon as 1 shows a foul test it is put last, and the order is 2, 1; 2 is now taking care of the H_2S, and 1 is under revivification. After a time, 2 shows a foul test, by which time 1 is clear again, and 2 in its turn is put under revivification. Assuming the boxes are large enough to admit of one being cleaned before the other is fouled—and it is here that the advantage of a preliminary reduction of the H_2S comes in—this alternative process can go on until the material is saturated with sulphur to such an extent that it begins to throw back pressure. There is yet another improvement, and that is to work downwards instead of upwards. For years it was the practice to have the inlet at the bottom, and the outlet at the top of the box. The result was that the first inch or so of the material on the bottom screen would become eaten, give rise to back pressure and necessitate a premature change, and the whole of the content had to be removed to get at it. With the inlet at the top, the gas at once comes into contact with a full, uninterrupted surface of material, more than twice that afforded by the interstices of the guide at the bottom. The condensed water is not confined to one particular vertical section, but is spread over the whole, and there is less risk of the material becoming sodden at any one part. And, if necessary the cover can be lifted and the upper surface broken up, raked over, or otherwise dealt with, the bulk being left undisturbed. It is obvious that these advantages become more apparent when working the new alternating system. More attention must also be given, not only to the purity, but to the mechanical condition of the material and to the nature of the foreign matter present. I should also mention that the hurdlegrid system is extending in favor. This is a framework that is built up on the bottom layer of screens and displaces any additional tiers. The oxide can be filled in solid to as high a level as is consistent with proper allowance for swelling, and, therefore, considerably more material can be put into a similar area.

The North of England Gas Association held a meeting a few days since, and one of the items on the progr amme was a lecture and

demonstration by Prof. P. Phillips Bedson, descriptive of Teclu's apparatus for ascertaining both the calorific and photometrical value of a sample of gas, by one simple operation in the course of a few minutes. It would appear from the description and the specimen of the apparatus exhibited, to be more useful on the gas works than the time honored jet photometer. It consists essentially of a strong glass bulb or globe, of one liter capacity, fitted with three necks or tubelures, one at top, one at bottom, and a third centrally on one side, supported in a suitable frame. The perpendicular necks are fitted to receive perforated corks carrying glass tubes, the lower for supply of gas, and the upper a plain piece of straight tube open at both ends, 13¾ inches long ½ inch bore. The dimensions of this piece of tube have been very carefully calculated, and their accuracy is a vital matter as regards the correct working of the apparatus. The side opening is slightly extended and reduced to a nozzle ½ inch diameter. A pendulum and quadrant calibrated scale are so adjusted that when the apparatus is at rest, it hangs perpendicularly with the indicating needle at zero on the scale, and a small cap on the bob exactly covers the nozzle just mentioned. An ordinary stop second dial as used for the photometer is also required. Gas is passed through for 15 seconds to clear the globe of air, then lighted at the upper end of the long tube, and allowed to burn for 30 seconds, when the gas supply is shut of. As the supply fails the flame diminishes and loses luminosity, and at the same time a certain amount of air is drawn in through the side tube, sufficient to form a firing mixture, and the flame slowly descends the tube and finishes up with a small explosion. The flame will take 20 to 30 seconds in descending the tube, and the actual time is read as closely as possible. The explosion displaces the cap and pendulum to a position proportioned to its violence, and there is a stop arrangement that prevents its return to the perpendicular, so the degree of displacement can be read on the scale at convenience, or verified by more than one operator. The time in seconds occupied by the flame in descending the tube is an indication of the specific gravity and, therefore, indirectly of the illuminating value, and the force of the explosion depends upon the calorific value. The whole force of the explosion does not act on the pendulum as a part will vent at the perpendicular tube, but as the proportion is the same in every case, this does not affect the result. Some practice will be necessary to secure close and at the same time reliable readings of the flame descent, but the simplicity and rapidity of the tests are strong points in its favor, and Prof. Bedson is entitled to the thanks of the profession as having introduced a novel and promising piece of laboratory apparatus.

A new addition to the government departments is the Road Board, appointed for the supervising of the construction and maintenance of the highways throughout the country, and this body has lately issued specifications referring to the use and the quality of tar. For surface dressing, the tar should be applied as soon as the boiling point is reached—220° to 240° F. The tar used is to be wholly derived from carbonization of bituminous coal, except that it may contain not exceeding 10 per cent. of products from carburetted water gas. The specific gravity at 59° F. shall be as nearly as possible 1.19, but may vary from 1.16 to 1.22, if complying with other conditions specified. It shall be commercially free from water, not containing more than 1 per cent. water or ammoniacal liquor, and the said water or liquor (if present) shall not contain more ammonia than 5 grains per gallon. On vigorous agitation, with 20 times its volume of water at 70° F., the tar shall not impart to the water more than 5 grains of pheneloid substances, reckoned as phenol, per gallon of water. On distillation it must yield not more than 1 per cent. below 170° C., and not less than 16 per cent. below 270° C., and not more than 26 per cent. of total distillate, exclusive of water. The free carbon shall not exceed 16 per cent. of the weight of the tar. If pitch is added to secure the specific gravity and proportion of residue above indicated, it must have been derived from tar of the foregoing description, and if one is added to heavy tar or pitch, for a similar purpose, the same applies, and it must be practically free from naphthaline or phenols. The specific gravity of such mixture shall be as nearly as possible 1.21, but shall not be less than 1.18 or more than 1.24. It shall yield no distillate up to 140° C. and not more than 3 per cent. up to 220° C., and the distillate shall be clear and free from solid matters when maintained at 30° C. for half an hour. Between 140° and 300° C. it shall yield not less than 15 per cent. or more than 21 per cent., and the free carbon shall not exceed 18 per cent. As a large demand is expected for this purpose, such official information is extremely useful as a means of indicating the quality required.

Management & Commercial Methods.

THE MORRIS IRON COMPANY, of 91 West street, New York, has placed on the market two designs of posts to be used in connection with inverted arc lamps, they are arranged to hold 3 lamps and 4 lamps, both designs being illustrated herewith. The bases are made

of cast iron, the columns of steel tubing, with wrought iron scrolls and cast iron ornamentations. The new "Bulletin" No. 20 is now ready for distribution.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 10 cents.

991,759. Burner. L. E. Shaw, New York City, assignor to the J. B. Colt Company, same place.

991,927. Gas Meter. J. R. Armstrong, Pittsburgh, Pa., assignor of one-third to W. H. Irvin, same place.

992,069. Safety Attachment for Gas Pipes. E. R. Schoolfield, Carbon, W. Va.

992,081. Scrubber and Method of Mingling Gas and Liquid and Creating Pressure in the Gas. G. M. S. Tait, Montclair, N. J., assignor to Gas Power Company, New York City.

992,106. Process of making a Gas Mixture. G. A. Bronder, Brooklyn, N. Y.

992,181. Gas Burner. B. Q. P. Foss, Chicago, Ills., assignor to Foss Gas Burner and Heating Company, same place.

992,219. Inverted Incandescent Gas Lamp. J. T. Lister, Cleveland, O.

992,279. Pressure Operated Gas Lighting and Extinguishing Apparatus. E. Sparks, London, England.

992,332. Combined Gas and Water Cock. A. E. Brion. Brooklyn, N. Y., and F. C. Sanford, Bridgeport, Conn.

992,431. Feeding Apparatus for Gas Producers. L. Lee, Youngstown, O.

992,491. Gas Producer. F. Fielden, River View, New Ferry, England.

992,523. Gas Producer. J. A. Waldburger, McKeesport, Pa., assignor to Porter-Miller Engineering Company, same place.

992,537. Time Actuating Device for Gas Cocks. E. Barber, Hartford, Conn.

992,615. Gas Producer. J. Stewart, Codnor Park, England.

992,654. Gas Light Attachment. C. W. Groening, New York City.

992,660. Gas Stove. J. G. Harvey, Chicago, Ills., assignor to American Stove Company, St. Louis, Mo.

992,706. Gas Washer. W. B. Clapman, New York City.

PUBLICATIONS.

The Transit.—Bulletin of the State University of Iowa, Iowa City. The 1911 edition contains a number of valuable engineering contributions which are well edited and arranged.

Drawing Tables.—Catalogue 17, of furniture made especially for engineers, architicts, etc. Economy Drawing Table Co., Toledo, O.

Data.—An engineering card index system, published monthly. Technical Data and Appliance Co., 92 La Salle street, Chicago, Ills. The index is made up on standard 3 by 5 cards and the whole engineering field is covered.

Autos.—Catalogue 9, Mack Bros. Motor Car Company, Allentown, Pa. A complete line of gasoline trucks, busses and stages is fully illustrated and described in a handsome and complete manner.

Fixtures.—Catalogue 19, devoted to gas fixtures exclusively, Beardslee Chandelier Mfg. Co., 229 South Clinton street, Chicago, Ills. Many handsome designs are illustrated for both upright and inverted burners.

Glassware.—Catalogue 12, covering shades, globes, reflectors, etc., for gas lamps. The Haskins Glass Co., Wheeling, W. Va. The designs illustrated are principally of etched glass suitable for both upright and inverted lamps.

Clean Bakeshops.—Leaflet based upon a report covering the sanitary condition of bakeshops to Mayor Gaynor, of New York city, issued by the Consolidated Gas Co. Used for advertising and also general distribution.

Street Lamps.—Leaflet covering five types of "Miner" lamps. Thos. T. W. Miner, 821 Eagle avenue, New York city.

Water Heaters.—Catalogues 11 and 12, instantaneous and automatic water heaters, Humphrey Company, Kalamazoo, Mich. Should there be a gas man who does not burn gas for fuel the Humphrey will "keep him in hot water," after he reads the contents of these handsome publications.

Items of Interest
FROM VARIOUS LOCALITIES.

"H. T. O.," writing from Hudson City, N. J., under date of the 22d inst., says: "The question as to which was the best lighted city in the world, came up between two men who have followed the public lighting situation for a number of years. One stated that the installation in Boston was undoubtedly far ahead of any other. The second party took the stand that the results obtained in Berlin were still better than those of the Boston example, further stating that gas lighted streets, following modern methods, showed up better than those electrically illuminated. The first speaker (he is identified with a large electrical apparatus manufacturing company) stated that, if the electrical interests had a lamp similar to the high pressure gas lamp, they would have accomplished greater things with it. And thereby hangs a tale!"

"E. G. R.," writing from Haverhill, Mass, under date of the 18th inst., says: In a recent issue of the JOURNAL I noticed you mentioned the fact that the Haverhill (Mass.) Gas Employees' Association was to open the club's rooms with a banquet, and believe me, we certainly did last Thursday night. We had a clever entertainment, good speaking and a fine all-round time. The dinner was served on the top floor of the premises, 104 Merrimack street, which premises also serve as the Company's offices, and, under the capable and deft direction of caterer Wiggins, an excellent dinner was served to a party whose membership represented all divisions of the Company's forces. When cigars were contributing aroma to the atmosphere of the big apartment, Mr. James E. Sullivan, in the capacity of toastmaster, having announced that the hour for talking was at hand, introduced Mr. Thomas Nickerson, Manager of the Company, and President of the Association, whose speech was indicative of the pride which pervaded him over the success of the organization, which he asserted was mainly due to the heartiness of the co-operation that animated the membership. The next speaker was Mr. Francis J. Honey, of Boston—he is a District Manager for the Stone & Webster corporation—whose chief theme was organization. Of course, his plan of narration was clearly defined, and his presentation of it was of the sort that easily appealed to the minds of his hearers. Judge John J. Winn—honest, earnest "John"—next told the men of how co-operation worked towards harmony, how harmony developed power and how power meant lasting success. Messrs. Hans von Vittinghoff, G. H. Priest and A. C. White, of the local force, spoke with good effect on matters relating to the good trend that intercourse of a social sort had upon their interests of all kinds, and these were followed by speeches from Messrs. Johnson, Cote, Field, Cronin, Sheldon, Ryan, Evans, Wason, Bell and Vaughn. Arthur Weldon and "Dick." Barry, in a varied song-monologue recital, got off quite some comedy matter, and "Joe." Farley caused the piano to sing out resplendent. The whole affair was of the best possible type, and the "send-off" was complete. The officers are; President, Thomas Nickerson; Vice-President, William Bell; Sergeant-at-Arms, Wm. Barnes; Secretary, E. G. Ryan; Treasurer, O. C. Johnson; Librarian, Wm. Cook.

MR. HARRISON WILLIAMS, of the Federal Light and Traction Company, of New York, having purchased the McComber-Little holdings of stock in the Gas and Electric and Traction Companies, of Springfield, Mo., has secured control thereof. It is not likely that the change in ownership will affect the executive staff of the named corporations.

IN a recent letter from a gentleman, prominent in the ownership of the Maquoketa (Ia.) gas plant, it is stated that 760 meters are now in active use, over 600 gas ranges are in service, and that 15 miles of mains are in line. The Company expects to have 800 meters set by October 1st, and that the daily output—now, 43,000 cubic feet per day—will then exceed 50,000 cubic feet.

THE Morris Iron Company, 91 West street, New York, reports the securing of two important contracts (respectively, from Joliet, Ills., and Texarkana, Tex.), for its combination trolley and lighting poles. Prior installations of posts of this type have been made by the Morris Company at Portland, Me., Poughkeepsie, N. Y., and Lincoln, Neb. At least a dozen cities will have installed this form of post before the end of the twelvemonth.

MR. HOWARD OLDS, Secretary of Bacon, Olds & Co., of Indianapolis, Ind., writing under date of the 19th inst., says: We wish to give you the true situation in Elwood, Ind., as we are more interested in that situation than anyone else in this part of the country. The Citizens Heat and Light Company has been purchased by ourselves and arrangements are being made for the installation of a new plant for the manufacture of artificial gas. We expect to start construction work there in a very short time; in fact, we hope to be supplying Elwood with artificial gas before the summer passes. We are operating, as you doubtless know, the New Castle Light, Heat and Power Company and the Shelby County Water, Gas and Electric Company, both of Indiana, and the Three Rivers (Mich.) Gas Company.

MR. W. E. HARTMAN, writing from Joliet, Ills., under date of the 19th inst., has this to say: "The American office of H. Koppers announces that it has been awarded another contract, in the shape of an agreement between the Coal Products Manufacturing Company, of Chicago, and H. Koppers, of Joliet, Ills., for 35 Koppers' improved combination coke and gas ovens. This plant will be erected near Joliet, and the surplus gas will be sold to the Western United Gas and Electric Company, of Aurora, Ills. The coke will be sold to the furnace and foundry trade as well as for domestic use. The improved combination coke and gas oven is the latest evolution along the lines that Mr. Kopper is working, and they are so constructed that they may be operated, either as coke ovens, using the lean gas given off from the coal to heat the ovens, or as gas ovens, using producer gas to heat the latter. In this instance the producer gas is generated in a separate gas producer apparatus, with small coke and coke breeze as producer fuel, which producer gas is thoroughly cleansed of all tar and dust before passing through the regenerators under the ovens."

"B. M. M.," writing from Port Arthur, Can., under date of the 18th inst., says that, at a meeting of the Inter-City Committee, ap-

pointed to meet the representatives of the different gas companies desiring to have the right to construct gas plants in Port Arthur and Fort William, was had in the latter place the afternoon of the 15th inst. Mr. F. H. Kufer and Mr. W. H. Powell, of the Brantford Gas Company, proposed to instal a plant and supply gas to the twin cities at the rate of $1 per 1,000 cubic feet, the Company to perform the work of distributing it; or, provided the city would supervise the distribution, the projector would furnish the gas at 75 cents per 1,000. This offer was to be in effect during the continuation of the life of the agreement, or until the consumption reached 100 million cubic feet per annum, at which point a readjustment of the rates would be in order. The Committee is considering the proposition on its face; the Wood-Powell proposal looks the reasonable one.

On the 8th of June, H. H. Mercer, as Solicitor for Messrs. C. S. Ball, C. A. Disbrow, J. W. Lovegood, J. N. Deter and A. G. Richwine, will appear before the Governor of Pennsylvania to ask for the right, under the name of the Porter Fuel Gas Company, to manufacture and supply gas for heat and fuel to the residents of Porter Township, Lycoming county, Pa.

Messrs. Chas. E. Ball, of Lock Haven, Pa, B. R. Lewis and R. T. Evans, have applied to the Governor of Pennsylvania for the right to operate the Avis Gas Company, in Avis and other centers of population in Pine Creek Township, Pa.

A decision was recently handed down by the Massachusetts Gas and Electric Light Commissioners, which, in common with its other records, affords strikingly fine testimony as to the value of keeping this body separate and distinctly apart from relations with any other State body. The decision had to do with the matter on appeal of the Worcester Electric Light Company *vs.* Alfred S. Lowell. The latter operates a department store in Worcester, and diagonally across Main street, at the corner of Foster street, is an electric lighting plant that is owned and operated by him. It furnishes light, heat and power to the building in which it is housed. The respondent obtained permission from the Mayor and Aldermen to construct a conduit across Main street to convey wires from the plant to the store. The Worcester Electric Light Company appealed to the Board of Gas and Electric Light Commissioners, contending that, if the permit of the latter Board were allowed to stand, it would establish a precedent upon which there would be nothing to preclude the Mayor and Aldermen from granting other permits to owners of private electric plants to build conduits and run wires to light any other building to the detriment of the business of the Company. The Board of Gas and Electric Light Commissioners, after a hearing and consideration of all the facts, presented an order that the appeal of the Worcester Electric Company be sustained and that the decision of the Aldermen be annulled. The Commission finds that in this case it was not contended that the Worcester Electric Light Company was not properly and adequately performing its public duties; that it was true that the petitioner (Mr. Lowell) had a grievance against the Company, but this was found to have arisen out of a mistake and promptly remedied. An examination of the order of the Worcester Mayor and Aldermen fails to discover that it is so restrictive in its terms as to confine the use of the proposed line exclusively to the supply of the A. S. Lowell Company. The law makes the A. S. Lowell Company and Mr. Lowell two distinct persons, and the statutes which provide for permits for private use are inapplicable to this case.

Mr. S. T. Baker, of Babylon, L. I., in replying to his query of the 26th inst., is informed that, by virtue of a decision, made public the 15th inst., of the U. S. Supreme Court, natural gas may be sent through pipe lines out of Oklahoma into other States. As matter of record the Court approved an injunction to prevent the Oklahoma authorities from preventing the Kansas Natural Gas Company from burying a pipe line under the certain surfaces into Oklahoma. The Court virtually holds that such interference would be in effect an interference with Inter-State commerce. Further, an Oklahoma statute sanctioning such interference was declared void, through the unconstitutionality thereof.

The jury in the case of W. W. Vincent, of Ashley, Pa., against the Wilkes-Barre (Pa.) Gas and Electric Company, who sued for damages done to one of his shade trees, occasioned by contact with an electric current carrying wire of defendant, the insulation of which was defective. determined in favor of plaintiff. He sued for $1,000, but the jury put the damage amount recoverable at $113.

At the hearing before the Public Service Commission, Second New York district, which hearing was held in Albany the 16th inst., testimony was taken in the case of certain residents as to the alleged unduly high rates charged for gas and electric currents by the Granville Electric and Gas Company; Mr. Milford B. Warden was the sole representative of the petitioners. In fact, he was the moving spirit in connection with the inception of the charges. Attorney Brodie G. Higley (he is also President of the Company) represented defendant, and he, in a series of questions, attempted to cause the admission from plaintiff that his action was largely based on personal spite, and sought to impress that fact all the more strongly by frequently adverting to the fact that he was the only complaining signer present. Commissioner Decker informed Mr. Higley that that line of defence would have no weight in the argument and averred the case would be considered solely on its merits. An accountant of the Commission has inspected the books of the Company to determine the use to which it was proposed to put the proceeds of certain securities which the Company intends to issue, the sum of which amounts to $12,000. Meanwhile the hearing is continued.

On the 23d inst., the Public Service Commission of Maryland, was to consider the application of the Baltimore Consolidated Gas, Electric Light and Power Company, for permission to issue 4½ per cent. bonds to secure the sum of $844,000, which sum it is declared is necessary to retire $262,000 of floating debt, and to pay for new property acquired and construction work done.

The following was forwarded us from New Orleans, La., under date of the 20th inst.: "Regarding the complaint made by F. J. Brugiere, of 2512 Barracks street, New Orleans, in respect of the inspection of a gas meter used on the premises of said Brugiere, Mr. R. E. Slade, Manager of the New Orleans Gas Company, remarked: 'The changing of meters is a matter of routine with us. Mr. Brugiere had no reason to complain about his meter, for when tested in an informal manner by the Company's experts, it was found 6.98 per cent. slow. In other words Mr. Brugiere was getting more gas than he was paying for.' In support of his contention he showed a report of recent meter tests, which were made according to the number of the meters and not according to the number of the house or the name of the consumer. Mr. Brugiere's meter figured in the list. In looking over the list it was found that in most instances the meters that had been taken out were working in favor of the consumer. In one instance the meter was as much as 20 per cent. slow, and other tests showed anywhere from 6 to 15 per cent. slow. The cause of the slowness of the meters was given in nearly every case of this sort as old age, the meter being worn out by constant use."

Manager Henry Bemer is quite well satisfied with the working of the new coal gas plant recently installed by the proprietors of the Chambersburg (Pa.) Gas Company.

Mr. Charles Forbes, formerly Manager of the Ottawa (Can.) Gas Company, died at his home in that city the morning of the 13th inst. He was in his 39th year, and, prior to his settling in Ottawa, had been connected with the London (Ont.) Gas Company. He was a member of the Canadian Gas Association, and his death was the sad sequel to an illness that covered a lengthy period.

The proprietors of the Big Rapids (Mich.) Gas Company have determined to rebuild the plant. The main system will also be extended.

The proprietors of the Superior (Wis.) Water and Light Company will make many extensions to the main system.

That this particular laborer deems himself worthy of his hire, looks shown in the case of Louis J. Behan, former District Attorney of Cook County, Ills., who demands as his tentative fee respecting the attempt of the Illinois State Board of Equalization to raise the valuation of the franchise and capital stock assessment that involves the payment on additional tax account in 10 years a total of $550,455. He asks, in effect, 10 per cent. of the sum involved, in case he succeeds in removing the injunction now effective in restraint of the collection.

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MONDAY, MAY 29, 1911.

The Market for Gas Securities.

The market for Consolidated gas did not feel in any marked degree the vibrant notes that disturbed the trading in "steels." The main result of the trading was to check for the time what seemed a surety in respect of a quick upward movement in local gas shares. Consolidated at noon to-day (Friday) was 145 to 145¼, and the floor seemed to carry more would-be buyers than positive sellers.

Brooklyn Union rules dull, and there is very little trading in it. However, it is noticeable that it seldom breaks the 142 bid figure. There can be no doubt that an important movement (on the high side) is near at hand in B. U. G. Peoples, of Chicago, shows no change, and a like remark applies to Lacledes. A farcical incident in connection with the Chicago situation is the frantic attempting of Mister Bemis to hook up with the authorities over their proposed final disagreement with the Hagenah report.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

MAY 29.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$78,177,000	100	145	145¼
Central Union Gas Co. — 1st 5's, due 1972, J. & J.	8,000,000	1,000	103	105
Equitable Gas Light Co.— Con. 5's, due 1932, M. & S.	1,000,000	1,000	115	118
Mutual Gas Co.	3,500,000	100	155	165
New Amsterdam Gas Co.— 1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98½	100½
New York and East River— 1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	95	100
Northern Union— 1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	50	70
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	103	105
The Brooklyn Union	15,000,000	1,000	142	144
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106¾	107
Yonkers	299,650	500	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	3/8	7-16
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	500,000	1,000	95	100
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	59	60
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,660,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	92	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90¼	91
Preferred	3,026,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	106½	—
Mortgages, 6's	3,600,000		89	100
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	—
Con. Mtg. 5's	976,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	3,500,000	—	102	105
Detroit City Gas Co.	6,580,000	—	—	50
" Prior Lien 5's	5,619,000	1,000	97	100½
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	30	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	108	108½
Indianapolis	2,000,000	—	78	83
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis.	10,000,000	100	106	106½
Preferred	2,500,000	100	94½	102
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	142	145
Madison Gas and Electric Co. " 1st Mtg. 6's	400,000	1,000	106	108¾
Massachusetts Gas Companies, of Boston	25,000,000	100	91⅛	91¼
Preferred	25,000,000	100	96	97
Montreal Gas Co., Canada	2,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	105¼	105½
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104¾	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.— 1st Mtg. 5's	1,000,000	1,000	100	102
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	104	106
Extension, 6's	800,000	1,000	112½	115
General Mortgage, 5's	3,447,000	1,000	97	98
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	101	103
Washington (D. C.) Gas Co.	1,600,000	200	410	412½
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	361	—

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, October 18, 19, 20, 21, 1911. St. Louis, Mo. Officers: President, Donald McDonald, Louisville, Ky. Secretary, A. B. Beadle, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting, June, 15, 16, 17, 1911. Quebec City, Quebec. Officers President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, Nov., 1911. New York City. Officers: President, C. B. Huntley, Buffalo, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street, New York City.

Guild of Gas Managers of New England.—Annual meeting, March. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, Walter G. Africa, Manchester, N. H.; Secretary, H. K. Morrison, Brockton, Mass.

Illinois Gas Association.—Annual meeting, time, March, Chicago, Ills. Officers: President, C. B. Strohn, Elgin, Ills.; Secretary-Treasurer, F. E Newberry, Dixon, Ills.

Illuminating Engineering Society.—Annual meeting, Oct. Chicago, Ill., 1911. Meetings of Sections, monthly. Pres't, A. E. Kennelly, Boston, Mass.; Secretary, Preston S Millar, 29 W. 39th street, N. Y. City. Sections: New York: Secretary, Albert J. Marshall, 36 West 39th street. New England, Secretary, W. S. Farrow, 1240 Massachusetts avenue, Cambridge, Mass. Philadelphia, Secretary, G. B. Muth, 1000 Chestnut street Chicago, Secretary, F. H. Bernhard, Marquette Building.

Indiana Gas Association.—Annual meeting, Jan. 17 and 18, 1912, Indianapolis. Officers: President, S. E. Mulholland, Fort Wayne; Vice-President, Howard L. Olds, Indianapolis; Secretary-Treasurer, Philmer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, time, May. 24, 25, 26, 1911; Clinton, Ia, Officers: President, Austin Burt, Waterloo, Ia.; Secretary and Treasurer, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, time, ———— Wichita, Kas. Officers: President, W. A. Scothorn, Hutchinson, Kas.; Secretary and Treasurer, J. D. Nicholson, Newton, Kas.

Michigan Gas Association—Annual meeting, time, Sept. 20, 21, 22, 1911; Detroit, Mich. Officers: President, A. P. Ewing, Detroit, Mich.; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April, 1912; St. Louis, Mo. Officers: President, F. E. Murray, Louisiana, Mo.; Secretary and Treasurer, N. J. Cunningham, Springfield, Mo.

National Commercial Gas Association.—Annual meeting, October 23-28, 1911. Denver, Officers: President, C. N. Stannard, Denver; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, ———————; Pittsburgh, Pa. Officers: President, John M. Garard, Columbus, O. Secretary, T. C. Jones, Delaware, O. Editor Wrinkle Department, F. W. Stone, Ashtabula, O.

New England Gas Association.—Annual meeting, third Wednesday in February, 1912; Boston. Officers: President, J. A. Coffin, Gloucester, Mass.; Secretary-Treasurer, N.W. Gifford, East Boston, Mass.

Ohio Gas Association—President, John M. Garard, Columbus, O.; Secretary-Treasurer T. C. Jones, Delaware, O.

Oklahoma Public Utilities Association.—Annual meeting, ————————. Officers: President, E. C. Reynolds; Secretary, Galen Crow, Guthrie, Okla.

Pacific Coast Gas Association.—Annual meeting, Sept. 20, 21 and 22, 1911, Oakland, Cal. Officers: President, F. A. Leach, Jr., Oakland, Cal.; Vice-President, W. Baurhyte, Los Angeles, Cal.; Secretary-Treasurer, John A. Britton, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, April, 1912, Williamsport, Pa. Officers President, C. W. Butterworth, Millon, Pa; Secretary-Treasurer, William H. Merritt, Lebanon, Pa.

Society of Gas Lighting.—Annual meeting, December, 1911; monthly meeting, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 254 West 89th street, New York city.

Southern Gas Association.—Annual meeting, April, 1912, Jacksonville, Fla. Officers: President, H. B. Hoyt, Jacksonville, Fla.; Secretary-Treasurer, E. D. Brewer, Atlanta, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. April 27, 28, 29, 1911; Houston, Tex. Officers: President, W. B. Tuttle, San Antonio, Tex.; Secretary, D. G. Fisher, Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May 17 and 18, 1911, Milwaukee, Wis. Officers: President, W. H. Winslow, Superior, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.

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ONE SEVEN-FOOT SIX-INCH UNITED GAS IMPROVEMENT WATER GAS SET.—This machine is complete with exception of condenser, and is being replaced with larger apparatus. Also one 55-HORSE POWER DeLAVAL STEAM TURBINE, direct connected to a No. 9 Sturtevant blower. All this apparatus is in first-class condition and immediate shipment can be made. Inquiries should be addressed to

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LIQUID AND GASEOUS FUELS, by Vivian B. Lewes. 334 pages. Price, $2.

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New Advertising, or Changes in Standing Ads., to insure attention the issue following their reception, Must be in Hand on Wednesday.

American Gas Furnace Co. 1068
American Gas Light Co. 1068
American Meter Co. 1091
Atlas Paint Co. 1064

Baehr, Wm. A. 1062
Baltimore Retort & Firebrick Co. 1080
Bartlett-Hayward Co. 1035
Berwind-White Coal Mining Co. 1082
Bredel Co., Fred. 1087
Bristol Co. 1073
Bronder, G. A. 1082
Brown Hoisting Machinery Co. 1077
Brown Instrument Co 1073
Burnham, R. E 1062
Byllesby & Co., H. M. 1063

Cabot Mfg. Co. 1083
Chaplin-Fulton Mfg. Co 1081
Chicago Bridge & Iron Works. 1084
Connelly Iron Sponge & Governor Co. 1081
Connersville Blower Co. 1075
Craig Ridgway & Sons 1065
Crane Co., Wm. M. 1039
Cruse Engineering Co. 1062
Cruse-Kemper Co. 1072

Davis & Farnum Mfg. Co. 1084
Deily & Fowler Mfg. Co. 1084
Dickey & Co., C. H. 1090
Didier-March Co. 1086
Dixon Crucible Co., Jos. 1057
Donaldson Iron Co. 1083
Drakes, Limited 1039
Dresser Mfg. Co., S. R. 1070

Evens & Howard Firebrick Co. 1062

Gardner, Jr., Co., James. 1084
Gas Bench Construction Co. 1090
Gas Engineering Co. 1071
Gas Machinery Co. 1076
Gautier & Co., J. H. 1080
General Gas Light Co. 1069
Gerould, C. L. 1080
Griffin & Co., J. J. 1092

Helme & McIlhenny 1091
Hone Co., F. de P. 1063
Humphrey Co. 1069
Humphreys & Glasgow 1063
Hunt Co., C. W. 1062

Improved Equipment Co 1065
Isbell-Porter Co. 1073

Keller, C. M. 1091
Kerr Murray Mfg. Co. 1082
Keystone Meter Co. 1090

Laclede-Christy Clay Products Co 1067
Lea, Henry I. 1063
Light, Geo. 1063
Light, Heat & Power Corporation 1058
Lloyd Construction Co 1073
Ludlow Valve Mfg. Co. 1083

Marston, Glenn 1064
Maurer & Son, H. 1091
McDonald & Co., D. 1089
Metric Metal Works. 1088
Michigan Ammonia Works. 1058
Miner, Thos. T. W. 1069
Missouri Firebrick Co 1090
Morris Iron Co. 1059
Mueller Mfg. Co., H. 1077

National Chamber Oven Co. 1035
New York Improved Meter Co. 1084
New York Rubber Co. 1068

Parker-Russell Mining & Mfg. Co. 1080
Parker & Co., C. D 1062
Pittsburgh Meter Co. 10-8
Piqua Blower Co. 1081
Pratt, E. G 1064

Quintard Iron Works. 1083

Ramsdell, Geo. G. 1062
Randolph, W. W. 1062
Rathbone, Sard & Co. 1059
Reynolds Gas Regulator Co. 1081
Riter-Conley Mfg. Co. 1075
Roots Co., P. H. & F. M. 1075
Rotary Meter Co. 1089

Safety Gas Main Stopper Co. 1083
South Chester Tube Co. 1057
Sprague Meter Co. 1089
Stacey Mfg Co. 1087
Standard Meter Co. 1090
Standard Oil Co 1067
Strassburger, Ernst. 1080
Sullivan Bros. 1063
Sun Vapor Street Light Co. 1057

Tufts Meter Co., W. 1090

United Gas Improvement Co. 1079

Welsbach Co. 1078
Welsbach Street Lighting Co. 1078
Western Gas Construction Co. 1040
Westmore and Coal Co. 1083
Witherby Co., E. E. 1063
Wood & Co., R. D 1077

CLASSIFIED LIST OF ADVERTISMENTS.

Ammonia Concentrators.
Bartlett-Haywood Co.
Bredel Co., F.
Gas Machinery Co.
Michigan Ammonia Works.
Western Gas Construction Co.

Apparatus.
See Coal Gas Plants,
Conveyors,
Stoking Machinery,
Water Gas Plants.

Arc Lamps.
See Lamps.

Bags—Gas.
American Meter Co.
New York Rubber Co.
See also Stoppers.

Bankers.
Parker & Co., C. D.

Benches—Complete.
Baltimore Retort & Firebrick Co.
Bredel Co., F.
Didier-March Co.
Evens & Howard Firebrick Co.
Gardner, Jr., Co., James.
Gas Bench Construction Co.
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Laclede-Christy Clay Products Co.
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National Chamber Oven Co.
Parker-Russell Mining & Mfg. Co.

Blast Furnaces.
American Gas Furnace Co.

Blowers.
See Exhausters.

Books.
American Gas Light Journal.

Burners, Fuel.
American Gas Furnace Co.

Burners, Lighting.
Crane Co., Wm. M.

By-Product Plants.
National Chamber Oven Co.

Calorimeters.
American Meter Co.

Carbonic Acid Extractors.
See Purifiers, Scrubbers.

Castings.
See Iron Work.
Pipe.

Cements.
Gerould, C. L.
Strassburger, E.

Couplings.
Dresser Mfg. Co., S. R.

Charging Machinery.
Bredel Co., F.
Bronder, G. A.
Davis & Farnum Mfg. Co.
Isbell-Porter Co.
Kerr Murray Mfg. Co.
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Coals.
Berwind-White Coal Mining Co.
Westmoreland Coal Co.

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Drakes, Limited.
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Riter-Conley Mfg. Co.
Stacey Mfg. Co.
United Gas Improvement Co.
Western Gas Construction Co.

Coal Handling Machinery.
Bronder, G. A.
Brown Hoisting Machinery Co.
Hunt Co., C. W.

Cocks—Lamp.
American Meter Co.
Crane Co., Wm. M.

Cocks—Meter and Service.
American Meter Co.
Mueller Mfg. Co., H.

Cookers.
See Ranges.

Coke Crushers.
Bartlett-Hayward Co.
Keller, C. M.

Condensers.
See Purifiers.

Conveyors.
Bartlett-Hayward Co.
Bredel Co., F.
Bronder, G. A.
Brown Hoistiug Machine Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Hunt Co., C. W.
Kerr Murray Mfg. Co.
Stacey Mfg. Co.
Western Gas Construction Co.

Elevators.
Craig Ridgway & Sons.

Engineers—Consulting.
Baehr, W. A.
Byllesby & Co., H. M.
Hone Co., F. de P.
Huuphreys & Glasgow.
Lea, Henry I.
Marston, Glenn.
Pratt, E. G.
Ramsdell, Geo. G.
Randolph, Wm. W.
Witherby Co., E. E.

Engineers—Contracting.
Bartlett-Hayward Co.
Bredel Co., F.
Bronder, G. A.
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Sullivan Bros.
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Enrichers.
See Oil

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Thermal Motor Co.

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Gas Bench Construction Co.
Gautier & Co., J. H.
Laclede-Christy Clay Products Co.
Maurer & Son, H.
Missouri Firebrick Co.
Parker-Russell Mining & Mfg. Co.

Fittings.
See Pipe.

Fixtures.
Welsbach Co.

Furnaces—Gas.
American Gas Furnace Co.

Gauges.
American Meter Co.
Bristol Co.
Brown Instrument Co.
Connelly Iron Sponge & Governor Co
Helme & McIlhenny.
McDonald & Co., D.

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Gas Machinery Co.
Isbell-Porter Co
Lloyd Construction Co.
Pittsburgh Meter Co.
Reynolds Gas Regulator Co.

Heaters.
See Ranges.
Water Heaters.

Heating Machines.
American Gas Furnace Co.

High Pressure Goods.
American Gas Furnace Co.
Mueller Mfg. Co., H.

Holders.
Bartlett-Hayward Co.
Chicago Bridge & Iron Works.
Cruse-Kemper Co.
Davis & Farnum Mfg Co.
Deily & Fowler Mfg. Co.
Kerr Murray Mfg. Co.
Riter-Conley Mfg. Co.
Stacey Mfg. Co.
Western Gas Construction Co.
Wood & Co., R. D.

Industrial Fuel Appliances.
See Furnaces.

Iron Work.
Chicago Bridge & Iron Works.
Cruse-Kemper Co.
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Riter-Conley Mfg. Co.
Stacey Mfg. Co.
Sun Vapor Street Light Co.
Wood & Co., R. D.

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American Meter Co.
Bristol Co.
Brown Instrument Co.
Connelly Iron Sponge & Governor Co.

Lamps.
American Gas Light Co.
Crane Co., Wm. M.
General Gas Light Co.
Miner, Thos. T. W.
Welsbach Co.
Welsbach Street Lighting Co.

Lamp Posts.
Donaldson Iron Co.
General Gas Light Co.
Miner, Thos. T. W.
Morris Iron Co.
Sun Vapor Street Light Co.
Welsbach Street Lighting Co.
Wood & Co., R. D.

Lantern—Safety.
Connelly Iron Sponge & Governor Co.

Machinery.
See Charging Machinery.
Coal Gas Apparatus.
Conveyors.
Water Gas Apparatus.

Mains.
Sullivan Bros.
See Also Pipe.

Mantles.
American Gas Light Co.
General Gas Light Co.
Welsbach Co.

Meters—Acetylene.
Keystone Meter Co.

Meters—Air.
Metric Metal Works.
United Gas Improvement Co.

Meter Connections.
Mueller Mfg. Co., H.

Meter Locks.
See Prepayment Meters.

Meters—Natural Gas.
Keystone Meter Co.
Metric Metal Works.
Pittsburg Meter Co.
Standard Meter Co.
Sprague Meter Co.

Meters—Prepayment.
American Meter Co.
Dickey & Co., C. H.
Griffin & Co., John J.
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Keystone Meter Co.
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New York Improved Meter Co.
Sprague Meter Co.
Tufts Meter Co., N.

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Metric Metal Works.
Pittsburg Meter Co.
Rotary Meter Co.

Meter Provers.
See Provers.

Meters—Regular.
American Meter Co.
Dickey & Co., C. H.
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Keystone Meter Co.
Metric Metal Works.
McDonald & Co.
New York Improved Meter Co.
Pittsburg Meter Co.
Standard Meter Co.
Sprague Meter Co.
Tufts Meter Co., N.

Meters—Station.
American Meter Co.
Dickey & Co., C. H.
Griffin & Co., John J.
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McDonald & Co., D.
Rotary Meter Co.
Standard Meter Co.
Tufts Meter Co., N.

Meters—Steam.
United Gas Improvement Co.
Western Gas Const. Co.

Meters—Test.
American Meter Co.
Dickey & Co., O. H.
Standard Meter Co.

Meters—Water.
Pittsburg Meter Co.

Meters—Wet.
American Meter Co.
Helme & Mellhenny.
Tufts Meter Co., N.

Oil.
Standard Oil Co.

Oil Tanks.
See Holders.

Outdoor Lighting Fixtures.
See Street Lamps.
Lamp Posts.

Patents.
Burnham, R. E.

Paints.
Atlas Paint Co.
Dixon Crucible Co., Jos.

Photometers.
American Meter Co.
Connelly Iron, Sponge and Governor Co.

Plants—Complete.
See Engineer—Contracting.

Pipe.
Davis & Farnum Mfg. Co.
Dresser Mfg. Co., S. R.
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Pipe Laying.
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Pipe—Wrought Iron.
South Chester Tube Co.

Prepayment Meters.
See Meters.

Processes.
See Coal Gas Apparatus.
Water Gas Apparatus.

Producer Gas Plants.
Gas Machinery Co.
Improved Equipment Co.
Wood & Co., R. D.

Provers—Meter.
American Meter Co.
Dickey & Co., C. H.
Helme & McIlhenny.
Metric Metal Works.
McDonald & Co., D.
Standard Meter Co.

Pumps—Drip.
American Meter Co.

Purifiers.
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Cabot Mfg. Co.
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Cruse-Kemper Co.
Davis & Farnum Mfg. Co.
Gas Engineering Co.
Gas Machinery Co,
Isbell-Porter Co.
Kerr Murray Mfg. Co.
Lloyd Construction Co
Quintard Iron Works.
Stacey Mfg. Co.
United Gas Improvement Co.
Western Gas Construction Co.
Wood & Co., R. D.

Purifying Materials.
Connelly Iron Sponge and Governor Co.
United Gas Improvement Co.

Purifier Trays.
Cabot Mfg. Co.
Lloyd Construction Co.

Pyrometers.
Bristol Co.
Brown Instrument Co.

Ranges—Gas.
Crane Co., Wm. M.
Rathbone, Sard & Co.

Regulators.
See Governors.

Retorts—Horizontal & Inclined.
Baltimore Retort and Fire Brick Co.
Didier-March Co.
Evens & Howard Firebrick Co.
Gardner, Jr., Co., James.
Gas Bench Const. Co.
Gautier & Co., J. H.
Laciede, Christy, Clay Prod Co.
Maurer & Son, H.
Missouri Fire Brick Co.
Parker-Russell Mining and Mfg. Co.

Retorts—Vertical.
Didier-March Co.
Gas Bench Const. Co.
Improved Equipment Co.
Laciede, Christy, Clay Prod. Co.
Parker-Russell Mining and Mfg. Co.

Rubber Goods.
New York Rubber Co.
See also Bags.

Services.
Sullivan Bros.
See also Pipe.

Service Boxes.
Morris Iron Co.
Mueller Mfg. Co., H.

Service Cocks.
American Meter Co.
Mueller Mfg. Co., H.
See also Cocks.

Scrubbers.
See Purifiers.

Scrubber Trays.
See Purifier Trays.

Specials.
See Pipe.

Stoking Machinery.
See Charging Machinery.

Stocks and Dies.
Mueller Mfg. Co., H.

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Safety Gas Main Stopper Co.

Storage Tanks.
See Holders.

Stoves.
See Ranges.

Street Lamps.
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Welsbach Street Lighting Co.

Structural Iron Work.
See Iron Work.

Tapping Machines.
Light, Geo.
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Tar Extractors.
See Coal Gas Apparatus.
Water Gas Apparatus.

Thermometers.
American Meter Co.
Bristol Co.
Brown Instrument Co.

Testing Apparatus.
See Instruments.

Tools.
Dresser Mfg. Co., S. R.
Light, Geo.
Mueller Mfg. Co., H.
Safety Gas Main Stopper Co

Tubing.
See Rubber Goods.

Valves.
Bartlett-Hayward Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Hunt Co., C. W.
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Roots Co., P. H. and F. M.
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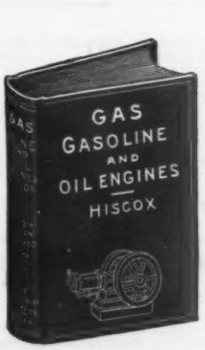

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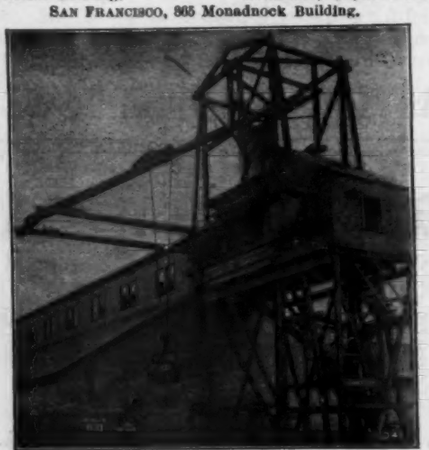

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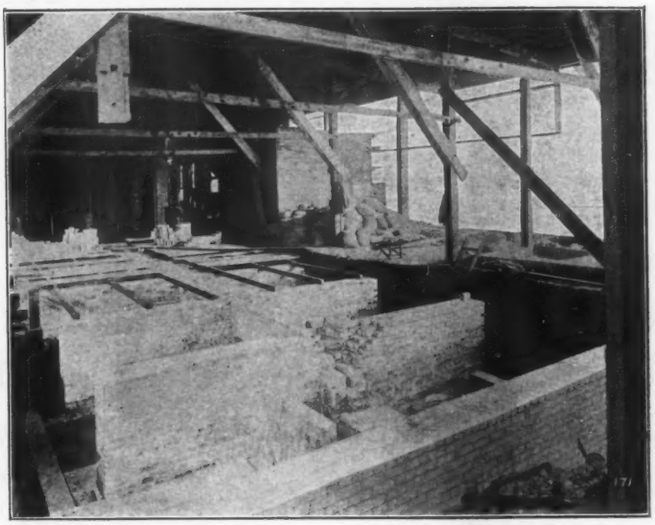

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[COMMUNICATED BY THE AMERICAN METER COMPANY.]

Day of Week.	MOONLIGHT SCHEDULE.		
	Date.	Light.	Extinguish.
Thursday	1	11.00 P.M.	3.30 A.M.
Friday	2	11.30	3.30
Saturday	3	12.00 F.Q.	3.30
Sunday	4	12.20 A.M.	3.30
Monday	5	12.50	3.30
Tuesday	6	1.10	3.30
Wednesday	7	1.30	3.30
Thursday	8	2.00	3.30
Friday	9	2.20	3.30
Saturday	10	No L.	No L.
Sunday	11	No L. F.M.	No L.
Monday	12	No L.	No L.
Tuesday	13	8.00 P.M.	10 30 P.M.
Wednesday	14	8.00	11.10
Thursday	15	8.00	11.50
Friday	16	8.00	12.20 A.M.
Saturday	17	8.00	12 40
Sunday	18	8.00	1.10
Monday	19	8.00 L.Q.	1.30
Tuesday	20	8.00	1.50
Wednesday	21	8.00	2.20
Thursday	22	8.00	2.50
Friday	23	8.00	3.30
Saturday	24	8 00	3.30
Sunday	25	8 00	3.30
Monday	26	8.00 N.M.	3.30
Tuesday	27	8.00	3 30
Wednesday	28	8.00	3.30
Thursday	29	8.00	3.30
Friday	30	8.00	3.30

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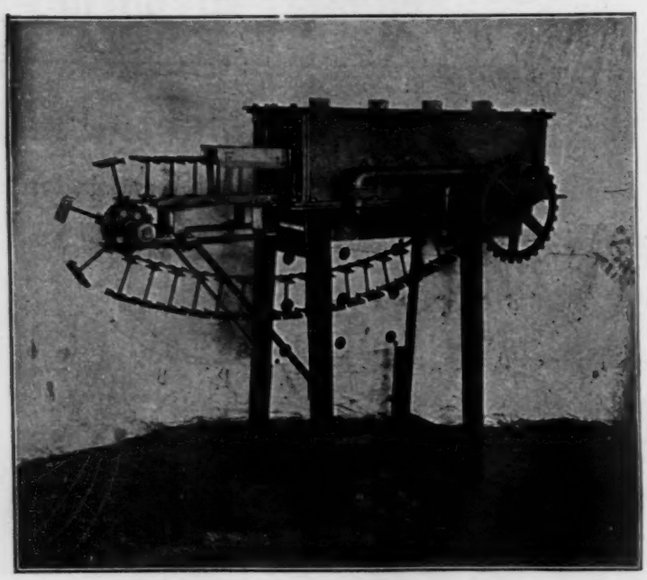

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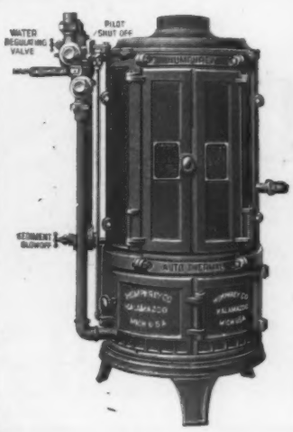

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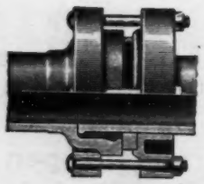
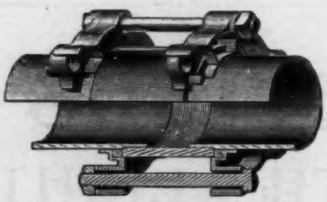


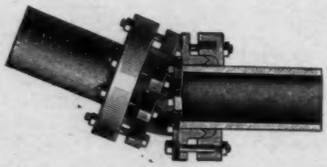
Clamp for Bell and Spigot Joints.

Style 4½.



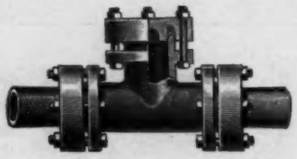
Clamp for Screw Collar.

Style 4.



Angle Couplings.

Style 28.



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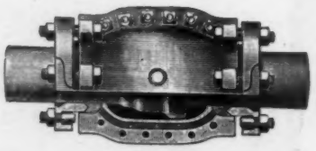
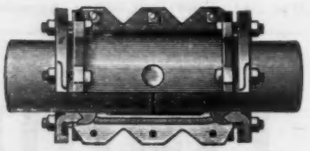


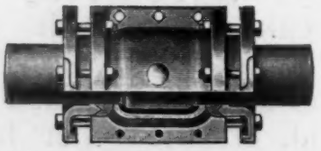
Heavy Split Sleeve for Cast Iron Pipe.

Style 26.



Light Split Sleeve for Cast Iron Pipe.

Style 27.



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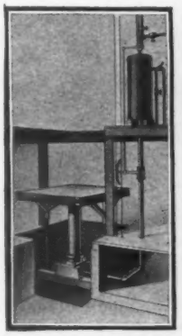

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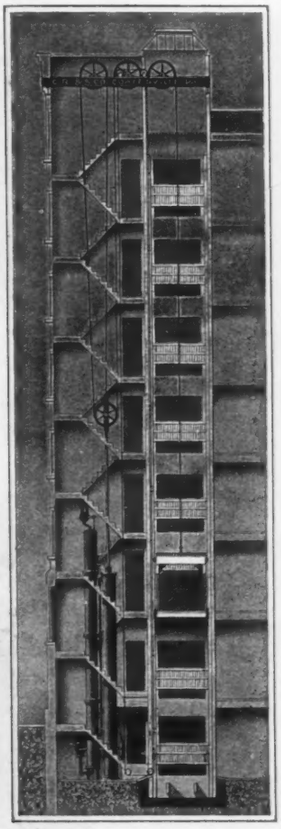

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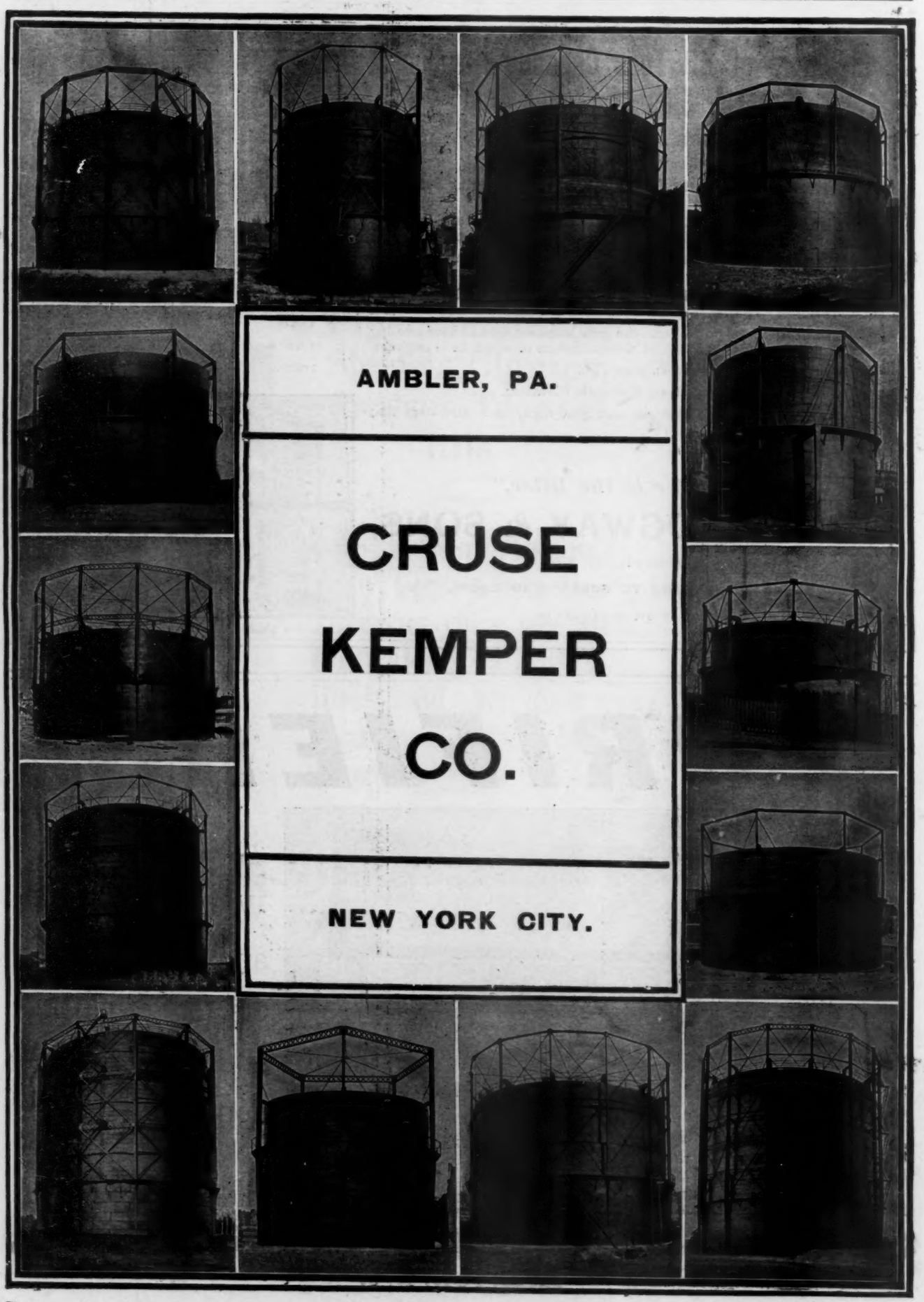
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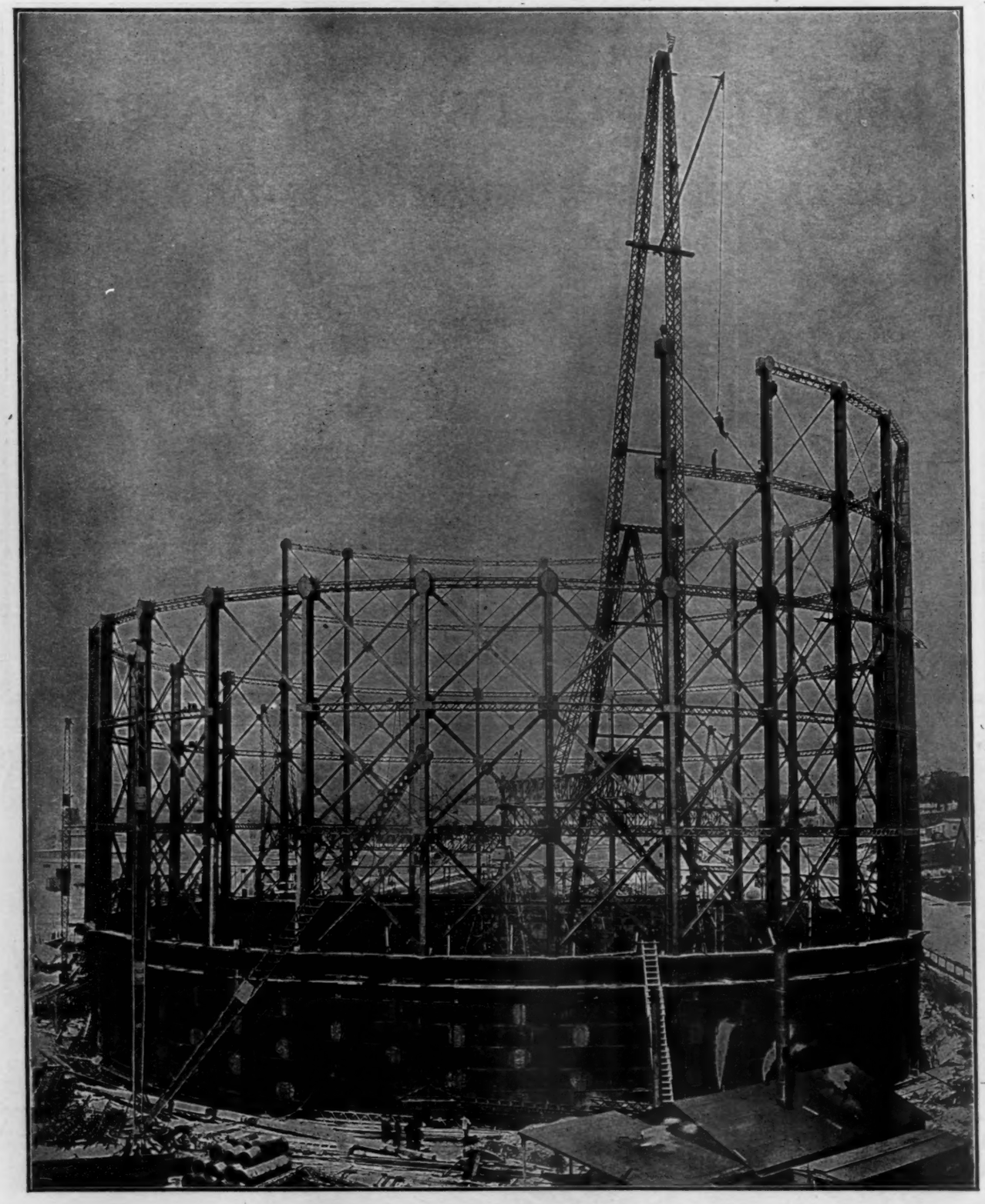

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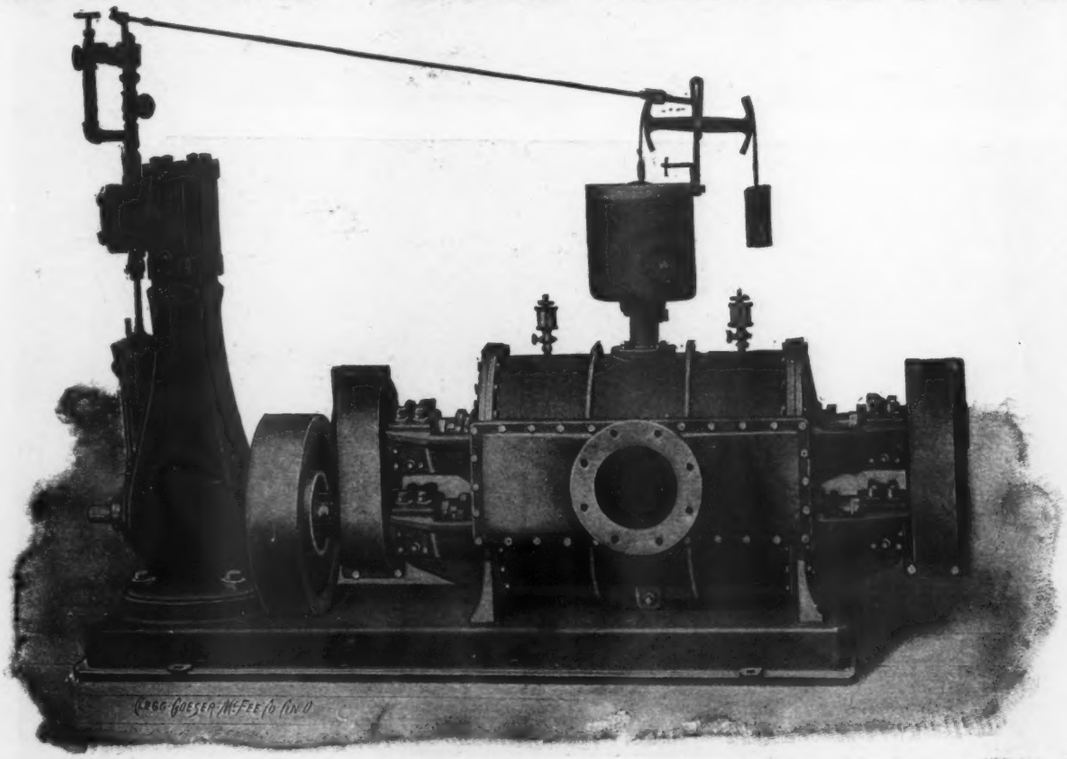

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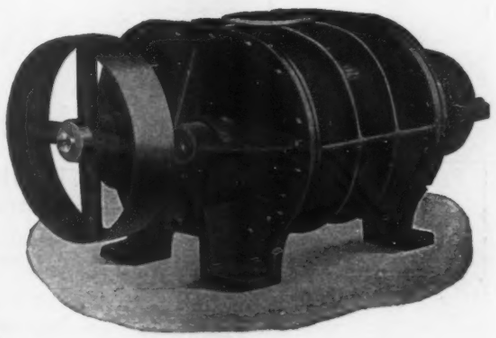

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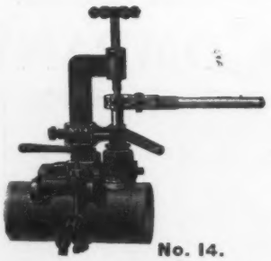
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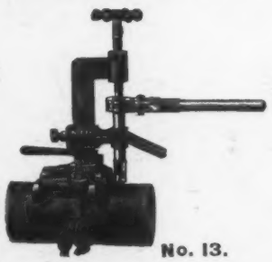
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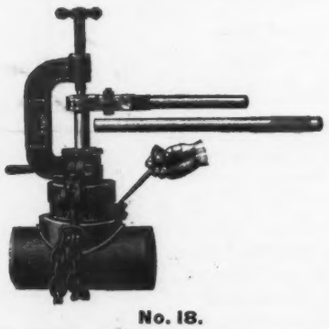
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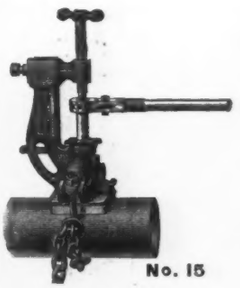
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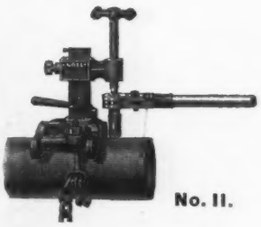
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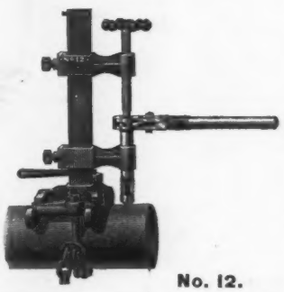
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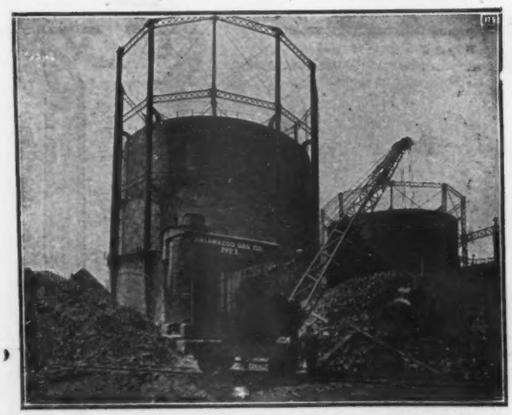

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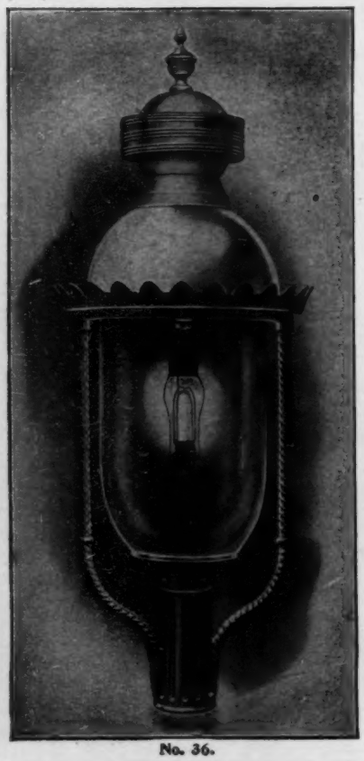

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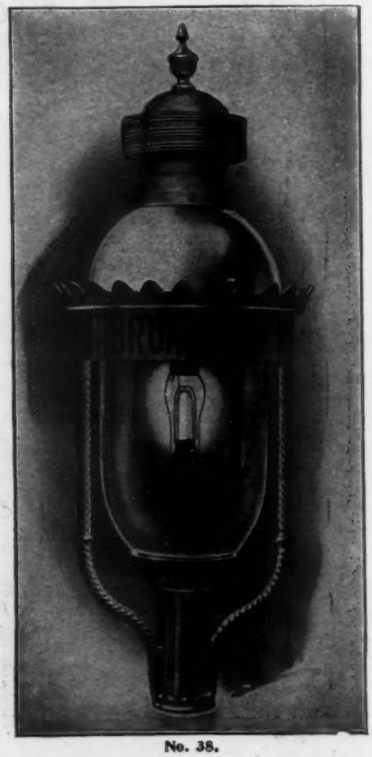

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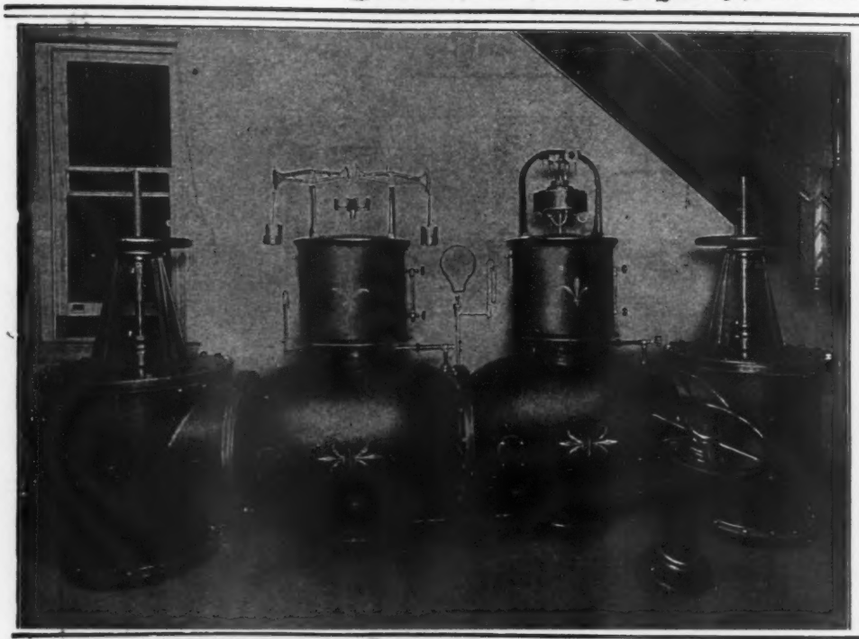

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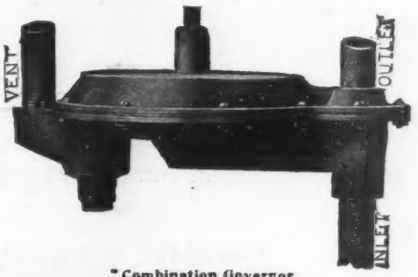

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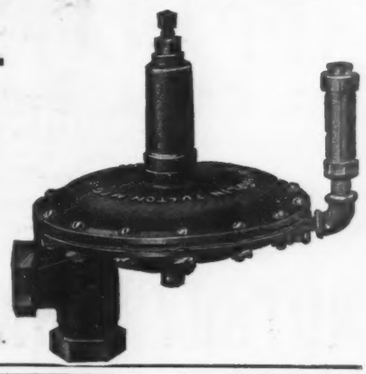

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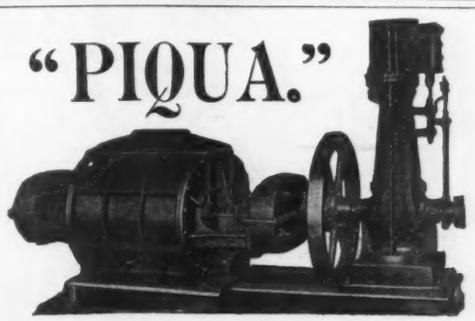

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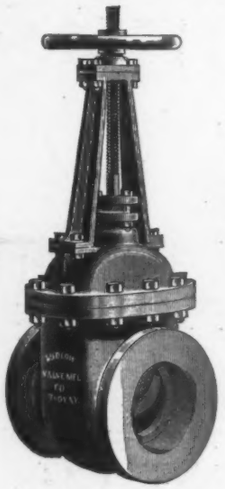

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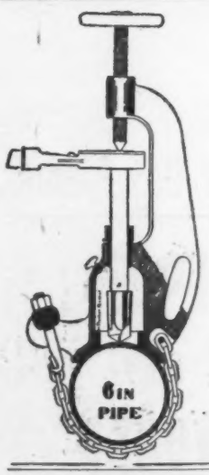

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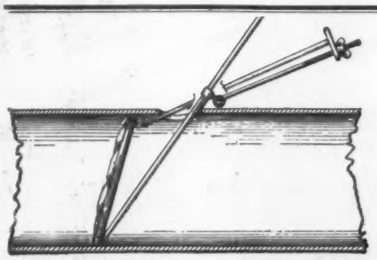

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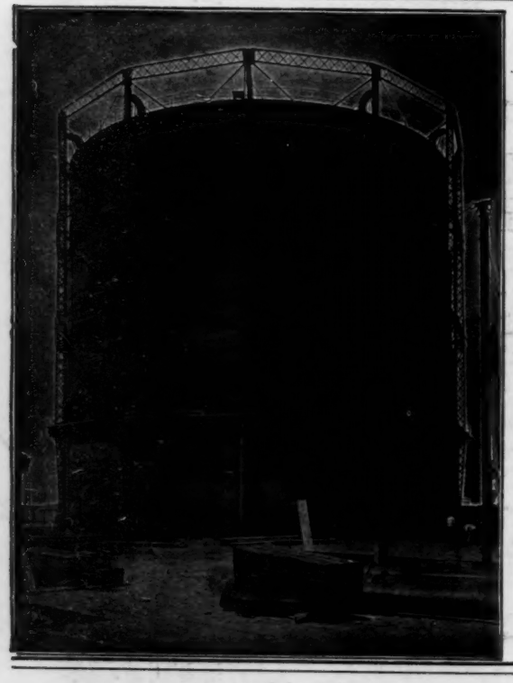

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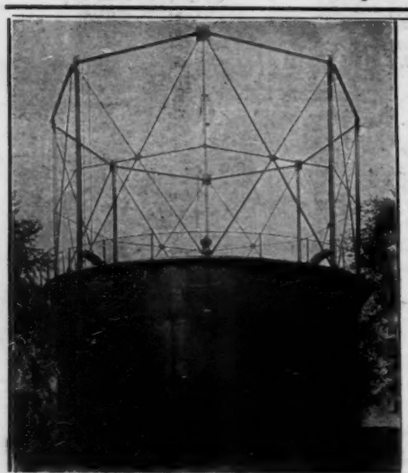

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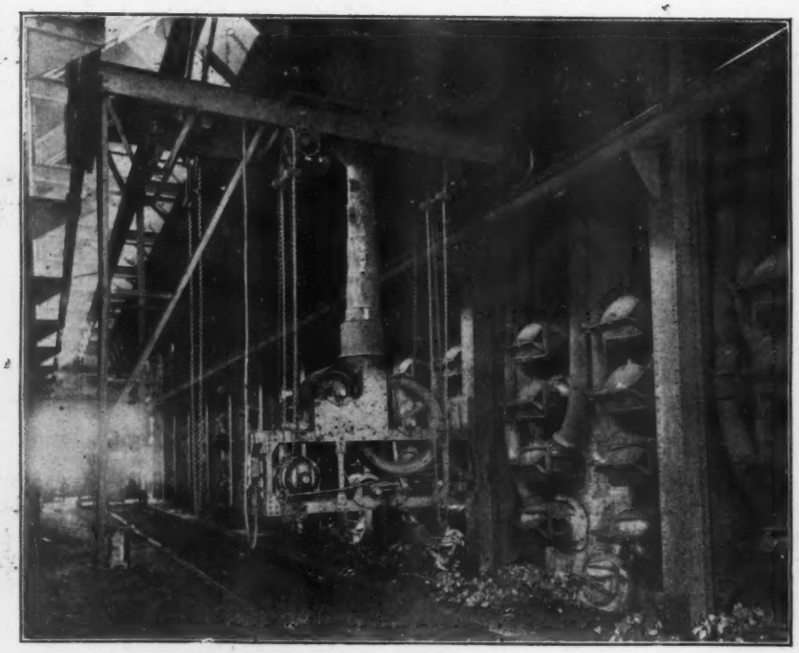

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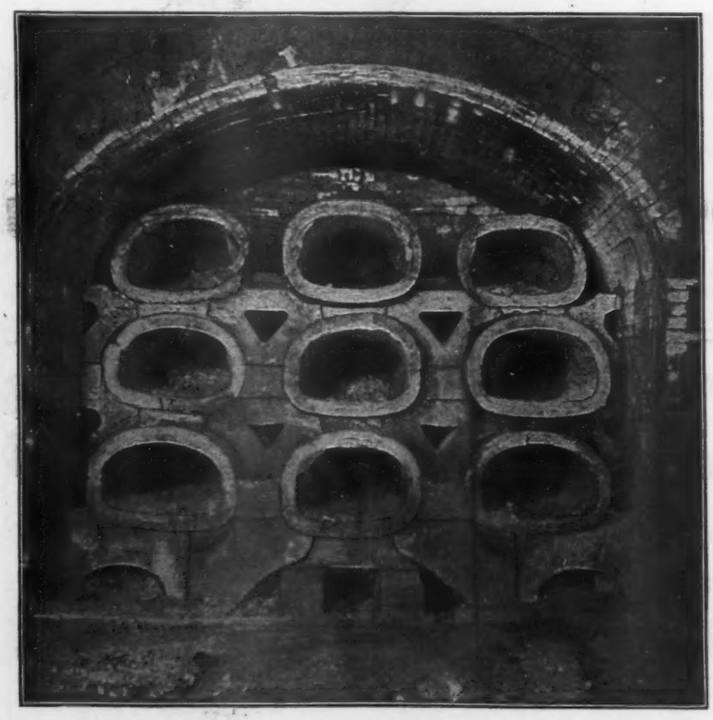

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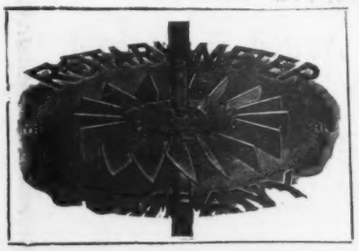

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